MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE.

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INTRODUCTION.

The MONTHLY WEATHER REVIEW for September, 1901, is based on reports from about 3,100 stations furnished by employees and voluntary observers, classified as follows: regular stations of the Weather Bureau, 159; West Indian service stations, 13; special river stations, 132; special rainfall stations, 48; voluntary observers of the Weather Bureau, 2,562; Army post hospital reports, 18; United States Life-Saving Service, 9; Southern Pacific Railway Company, 96; Hawaiian Government Survey, 200; Canadian Meteorological Service, 32; Jamaica Weather Office, 160; Mexican Telegraph Service, 20; Mexican voluntary stations, 7; Mexican Telegraph Company, 3; Costa Rican Service, 7. International simultaneous observations are received from a few stations and used, together with trustworthy newspaper extracts and special reports.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Meteorologist to the Hawaiian Government Survey, Honolulu; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Mr. Maxwell Hall, Government Meteorologist, Kingston, Jamaica; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; Commander Chapman C. Todd, Hydrographer, United States Navy; H. Pittier, Director of the Physico-Geographic Institute, San Jose, Costa Rica; Captain François S. Chaves, Director of the Meteorological Observatory, Ponta Delgada, St. Michaels, Azores, and W. M. Shaw, Esq., Secretary, Meteorological Office, London; Rev. Josef Algué, S. J., Director, Phillipine Weather Service.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. The Hawaiian standard meridian is 157° 30′, or 10^h 30^m west of Greenwich. The Costa Rican standard of time is that of San Jose, 0^h 36^m 13^s slower than seventy-fifth meridian time, corresponding to 5^h 36^m west of Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local standard is mentioned.

Barometric pressures, whether "station pressures" or "sea-level pressures," are now always reduced to standard gravity, so that they express pressure in a standard system of absolute measures.

During the temporary absence of Professor Abbe, Mr. H. H. Kimball has been designated Acting Editor of the REVIEW.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

Forecasts of the direction and force of the wind and the state of the weather along the transatlantic steamer routes from the north Atlantic coast of the United States to the Banks of Newfoundland were issued from Washington daily at 8 a. m. and 8 p. m. These forecasts covered the first three days out of steamers bound east from New York and Boston, and the morning forecasts were published, with forecasts of fog, in the weather maps issued at Boston, New York, Philadelphia, Baltimore, and Washington.

The most important tropical storm of the month appeared near the Island of St. Kitts on the 11th; moved thence westward over the north part of the Caribbean Sea from the 12th to the 15th, recurved over the Gulf of Mexico and reached the middle Gulf coast of the United States by the 17th, and passed from that section northeastward off the south Atlantic coast of the United States. While this disturbance was lacking in the energy of a hurricane it was attended by high winds and heavy rain throughout its course.

Several storms of marked strength for the season, visited the Great Lakes. The first of these crossed the upper lakes during the 7th and 8th, causing some disasters to shipping in southern Lake Huron. The period from the 11th to the 17th was a stormy one in the Lake region, and shipping on Lakes Michigan and Huron suffered some damage. Unsettled weather also prevailed on the lakes from the 21st to the 25th. The first winter-type storm of the season appeared on the north Pacific coast during the evening of the 20th, causing severe gales at sea and continued rain. On the 20th and 21st rain warnings were issued to California fruit growers and railroads.

Timely and accurate warnings were issued in connection with all of the general storms which appeared in the United States and the West Indies.

The first general frost-bearing cool wave of the season swept from the northeastern Rocky Mountain slope southward to Arkansas and Tennessee, and eastward to the north Atlantic coast States from the 17th to the 20th. In the north Pacific coast districts frost occurred on a number of dates.

Ample warnings were distributed throughout the districts visited by the frosts of the period referred to.

CHICAGO FORECAST DISTRICT.

The month was an unusually stormy one for the season on the upper lakes, and it was marked by a larger number of marine disasters than has occurred during any previous month for many years.

During the storm of the 7–8th several vessels were wrecked at the foot of Lake Huron. The disasters were due, however, rather to dense smoke than to high winds, and several shipmasters mistook lights on the shore about three miles from the end of the lake for lights at the entrance of the St. Clair River, and went ashore. Brisk and possibly high northerly winds were forecast for Lake Huron the morning of the 6th, and on the morning of the 7th the forecast was for brisk to high northerly winds. High winds prevailed on the upper lakes from the 15th to 17th, impeding navigation and causing some wrecks. The approach of this storm was announced in the forecasts and by the display of storm warnings. High and dangerous winds occurred from the 21st to 25th, but as vessel men sought shelter as soon as the warnings were hoisted no wrecks of consequence occurred.

General warnings were issued well in advance of the frosts of the middle part of the month.—*H. J. Cox, Professor.*

NEW ORLEANS FORECAST DISTRICT.

A disturbance of tropical origin for which storm warnings were ordered, reached the middle Gulf coast on the 17th, attended by high winds at the mouth of the Mississippi River and at points along the Mississippi coast. Timely frost warnings were issued for Arkansas on the 18th, and on the morning of the 19th unseasonably cold weather prevailed over Arkansas and Louisiana, the temperature at New Orleans being the lowest ever recorded in September.—*I. M. Cline, Forecast Official.*

DENVER FORECAST DISTRICT.

Apart from the frosts that visited the agricultural sections of this district, and which were accurately forecast, the weather conditions were such as to require no special warnings.—*F. H. Brandenberg, Forecast Official.*

SAN FRANCISCO FORECAST DISTRICT.

On the 20th conditions were such that warnings were distributed to fruit growers to be prepared to cover promptly. On the morning of the 21st rain warnings were issued to raisin makers and prune growers, also to all railroad station agents where grain was likely to be held in sacks and exposed to the weather. These warnings were of the greatest benefit and where losses occurred they were due to the inability of those warned to remove their goods.—*Alexander G. McAdie, Professor.*

PORTLAND, OREG., FORECAST DISTRICT.

On the evening of the 20th conditions indicated high winds at sea, and warnings were issued to Washington and Oregon ports. The storm proved to be the first one of this season of a type peculiar to the winter months, and was attended by high winds and rain throughout the district. The frosts of the month were forecast sufficiently far in advance to allow a wide distribution of the warnings.—*Edw. A. Beals, Forecast Official.*

HAVANA, CUBA, FORECAST DISTRICT.

The only severe storm of the month was first indicated to the east-southeast of St. Kitts on the afternoon of the 10th. During the succeeding five days this disturbance moved slowly westward over the Caribbean Sea, its approach being heralded by full and timely advices and warnings. Reports received from points in the southern districts of the islands of the Greater Antilles and from vessels that entered its area show that the storm possessed considerable strength, which was manifested largely as heavy rain that flooded rivers and smaller streams.—*Wm. B. Stockman, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	5, a. m.	54	121	9, p. m.	36	76	2,575	4.5	572	23.8
II	15, p. m.	48	125	21, a. m.	47	53	4,470	5.5	813	33.9
III	18, a. m.	54	121	22, a. m.	45	67	3,545	4.0	885	36.8
IV	23, a. m.	53	108	27, a. m.	41	70	2,050	4.0	512	21.3
Sums							12,640	18.0	2,782	115.8
Mean of 4 paths							3,160		696	29.0
Mean of 18.0 days									702	29.2
Low areas.										
I	1, a. m.	44	116	6, a. m.	47	92	2,150	5.0	430	17.9
II	8, p. m.	41	97	11, p. m.	48	69	1,600	3.0	533	22.2
III	9, p. m.	39	108	14, a. m.	47	53	3,250	4.5	722	30.0
IV	11, a. m.	16	63	18, p. m.	35	76	3,000	7.5	400	16.7
V	12, a. m.	48	125	17, a. m	47	53	3,575	5.0	715	29.8
VI	20, a. m.	51	120	24, a. m.	47	53	3,500	4.0	875	36.4
VII	22, p. m.	40	122	25, a. m.	50	100	1,700	2.5	680	28.3
VIII	27, a. m.	30	83	30, p. m.	46	60	2,300	3.5	629	26.2
Sums							20,975	35.0	4,984	207.5
Mean of 8 paths							2,622		623	25.9
Mean of 35.0 days									599	24.8

For graphic presentation of these highs and lows see Charts I and II.—*Geo. E. Hunt, Chief Clerk Forecast Division.*

RIVERS AND FLOODS.

The usual seasonal low water stages prevailed in the upper Mississippi River during the month of September, with extreme fluctuations of less than one foot over that portion north of St. Louis, Mo. In the lower river the average stages were somewhat higher than during August, 1901, the influence of the rise of that month not having entirely disappeared. At St. Paul, Minn., navigation was suspended for the season on the last day of the month.

The average stages of the Missouri River were about one foot lower than during the preceding month. At Sioux City, Iowa, on the 12th, the river reached its highest recorded September stage, 9.1 feet, one of the consequences of the heavy storm of the previous day.

Nothing of interest was reported from other rivers except those of the South Atlantic States, where the heavy rains of the 16th and 17th caused a general and decided rise. The Cape Fear River at Fayetteville N. C., rose 39.6 feet from the 16th to the 20th, passing the danger line of 38 feet on the 19th, and reaching a crest stage of 43.6 feet on the morning of the 20th.

The flood stages of the rivers of South Carolina were well forecast, and the following report thereon was made by Mr. L. N.

Jesunofsky, official in charge of the United States Weather Bureau office at Charleston, S. C.

The streams in South Carolina were nearly bank full at the beginning of the month. Tides were exceedingly short, about half ebb only. This, coupled with the high water, resulting from the prolonged period of northeasterly winds, produced abnormal tides of 1.5 to 2.5 feet along the portions of fresh water streams within the tidal sections of the coast. The tides seriously retarded the outflow of the freshet waters on the lower Santee River and in Winyah Bay, endangering the rice plantations of those localities. The conditions prevailing during the latter half of August continued throughout this month, and in consequence the rice planters could not drain their lands for harvesting. Much rice was lost thereby.

Heavy rainfall over the upper catchment basins during the 16th and 17th caused a rapid run-off, and raised the Wateree at Camden, S C., 21.9 feet during the 18th and 19th; the danger line, 24 feet, was reached during the afternoon of the 18th. The stream began to recede rapidly about 10 a. m. of the 20th, at which time it fell below the danger point.

The Pedee, at Cheraw, S. C., rose 24 feet during the 18th and 19th to a maximum stage of 30.3 feet, passing the danger line. 27.0 feet, at about 5 a. m. of the 19th. There was a slow decline during the night of the 19th. It began to recede rapidly during the night of the 20th, passing the danger point, on its downward course at noon of the 20th.

There was a rise of 17.7 feet in the Congaree, at Columbia, S. C., during the 18th and 19th. It reached the danger point, 15.0 feet, at 10 a. m. of the 18th, and had fallen below the danger line by 1 a. m. of the 21st.

The lower Santee, at St. Stephens, S. C., was 0.1 to 0 5 of a foot above the danger line (12 feet) on the 6th, 7th, 26th, and 27th. Its fluctuations were exceedingly small during the entire month, owing to the high tides noted above.

The lower Pedee, at Smiths Mills, S. C., remained at high stages throughout the month. It rose to, and slightly above, the danger point on the 27th and 28th. Its seaward course during the last half of the month was very much retarded by the frequent high tides, which banked up the earlier freshet waters within Winyah Bay, thus causing a slow decline.

The rivers of eastern and southern Georgia were also generally above the danger lines, but, as far as has been ascertained, no considerable damage was done except along the Ocmulgee and lower Flint rivers. Timely warning was given of the approach of the flood stages in the former river.

The highest and lowest water, mean stage, and monthly range at 134 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport on the Red.—*H. C. Frankenfield, Forecast Official.*

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following summaries relating to the general weather and crop conditions are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau.

[Temperature is expressed in degrees Fahrenheit and precipitation in inches and hundredths.]

Alabama.—The mean temperature was 72.1°, or 2.7° below normal; the highest was 95°, at Bermuda, Tuskegee, and Wetumpka on the 9th and at Livingston on the 15th, and the lowest, 39°, at Riverton on the 19th. The average precipitation was 4.19, or 1.48 above normal; the greatest monthly amount, 11.45, occurred at Eufaula, and the least, 1.10, at Livingston.

Rather cool and unfavorable, retarding opening of cotton, with light frost in northern counties from 19th to 22d; excessive and damaging rains in southeast counties.—*F. P. Chaffee.*

Arizona.—The mean temperature was 75.4°, or 0.5° below normal; the highest was 114°, at Mohawk Summit on the 2d, and the lowest, 24°, at Flagstaff on the 25th. The average precipitation was 0.48, or 0.55 below normal; the greatest monthly amount, 3.90, occurred at Duncan, while none fell at a great number of stations.

Conditions were generally favorable for plant development during the first half, but a diminished water supply for irrigation in the lower agricultural valleys and cold weather in the northern tier of counties retarded further growth during the latter part of the month. Farming operations were backward, as on account of the dryness of the soil, but little fall plowing and seeding could be done.—*Wm. G. Burns.*

Arkansas.—The mean temperature was 72.6°, or 1.2° below normal; the highest was 101°, at Pine Bluff on the 9th and 10th and at Rison on the 8th and 10th, and the lowest, 32°, at Pond on the 18th. The average precipitation was 3.08, or 0.22 below normal; the greatest monthly amount, 8.87, occurred at Marvell, and the least, 0.17, at Hardy.

Hot days and comparatively cool nights, with very unevenly distributed rainfall characterized the month. Light frost occurred in various localities on the 18th and 19th, but the damage was inappreciable. Cotton was opening fast, with picking in rapid progress; indications point to a very light yield. Corn was all matured, and about all cut and housed; the yield is very unsatisfactory. Apples were generally a failure. Irish potatoes, peas, and turnips were not doing well.—*Edward B. Richards.*

California.—The mean temperature was 66.0°, or 2.3° below normal; the highest was 114°, at Volcano on the 17th, and the lowest, 15°, at Bodie on the 24th. The average precipitation was 0.94, or 0.05 above normal; the greatest monthly amount, 6.28, occurred at Crescent City, while none fell at 28 stations.

Conditions were generally favorable for crops during the month, although the temperature was below normal most of the time. Rain was general throughout the State on the 23d and 24th, but as warnings had been given there was very little injury to raisins and drying fruits; grapes on the vines, grain in sacks, and unbaled hay were slightly damaged.—*Alexander G. McAdie.*

Colorado.—The mean temperature was 58.8°, or about normal; the highest was 96°, at Lamar on the 9th and at Las Animas on the 26th, and the lowest, 9°, at Wagon Wheel Gap on the 25th. The average precipitation was 0.65, or 0.30 below normal; the greatest monthly amount, 2.86, occurred at Wallet, while none fell at Montrose and only a trace at Glenwood Springs, Grand Junction, Tennessee Pass, and Las Animas.

Weather favorable to belated crops, harvesting, and thrashing, but soil too dry for plowing, seeding, and the germination of winter grain. The showers were generally confined to the first decade and were very beneficial to ranges, potatoes, and the third growth of alfalfa, and the last-named crop was heavier than the conditions during August gave reason to expect. A good acreage of corn had been cut for fodder but the remainder matured nicely and a fair crop was gathered. Potatoes suffered no material damage by frosts and a heavy yield is indicated. At the close of the month ranges as a whole were in satisfactory condition. A rather destructive hailstorm occurred in Weld County on the 6th; wheat in shock, potatoes, sugar beets, and late alfalfa were injured. High winds were general on the 24th and caused considerable damage to hay in stack and windrow, besides blowing off many late apples and breaking trees in localities.—*F. H. Brandenburg.*

Cuba.—The mean temperature was 80.3°; the highest was 100°, at Nuevitas on the 1st, and the lowest, 60°, at Santa Clara on several days. The average precipitation was 10.92; the greatest monthly amount, 21.15 occurred at Plantation Providencia (Guines), and the least, 3.20, at Nuevitas.

Very uniform and seasonable temperature. Rains were frequent and very heavy in most sections, on account of which all field work was very much retarded, lowland crops damaged in many localities, and numerous tobacco seed beds ruined. Sugar cane on high ground, however, grew luxuriantly and at the close of the month its condition was highly satisfactory. Minor products are very scarce in some districts, but over the greater portion of the island they are fairly good and abundant.—*W. B. Stockman.*

Florida.—The mean temperature was 79.1°, or 0.2° above normal; the highest was 98°, at Eustis, Fort Meade, and Ocala on the 13th and at McAlpin on the 14th, and the lowest, 54°, at Wausau on the 20th and at Tallahassee on the 27th. The average precipitation was 8.38, or 1.04 above normal; the greatest monthly amount, 17.55, occurred at New Smyrna, and the least, 3.37, at Lake Butler.

During the first week rainfall was excessive over a large portion of the State, interfering somewhat with the harvesting of corn. Cotton made no improvement, and there was considerable complaint of rust and shedding. Precipitation was less damaging during the second week, and there were some sections where showers would have benefited vegetables. During the third week rain retarded cotton picking, but fair progress was made with fall plowing. The closing week was decidedly damaging in northern and central districts by reason of heavy rains.—*A. J. Mitchell.*

Georgia.—The mean temperature was 73.1°, or 2.0° below normal; the highest was 101°, at Fleming on the 14th, and the lowest, 41°, at

Diamond on the 19th. The average precipitation was 5.19, or 2.29 above normal; the greatest monthly amount, 13.28, occurred at Americus, and the least, 1.25, at Statesboro.

One of the coolest Septembers in the past ten years, and the rainiest within that period. Cool weather prevailed from the 19th to the 23d, with light frosts in a few of the northern counties. Rainfall excessive in many counties, particularly on the 17th and 18th, when amounts of from 6 to over 8 inches fell in central sections. Cotton picking was active during the earlier and latter portions of the month, but was virtually suspended during the second decade. The crop was regarded as below the average, and the top crop was very poor. Minor crops were generally satisfactory.—*J. B. Marbury.*

Idaho.—The mean temperature was 54.0°, or 2.2° below normal; the highest was 97°, at Fayette on the 1st, and the lowest, 11°, at Chesterfield on the 14th. The average precipitation was 1.20, or 0.22 above normal; the greatest monthly amount, 3.15, occurred at Murray, and the least, 0.09, at Downey.

On the morning of the 22d there was a heavy snowstorm in the Saw Tooth, Cœur d'Alene, and Rocky Mountain ranges. On the summits of the high mountains the snow fell to the depth of 1 foot, and there was some snow on the hills down to the 3,000-foot level. The first decade was remarkable for frequent frosts, but no material damage was done to crops.—*S. M. Blandford.*

Illinois.—The mean temperature was 66.6°, or 0.4° below normal; the highest was 100°, at Greenville on the 9th, and the lowest, 28°, at Kishwaukee and Shobonier on the 19th. The average precipitation was 1.94, or 1.23 below normal; the greatest monthly amount, 5.41, occurred at Wellington, and the least, 0.40, at Danville and Effingham.

The first half of the month was warm and favorable for ripening corn. This was followed by about a week of cool weather, during which light to killing frosts occurred throughout the State, causing considerable damage to corn in some localities. Good rains from the 9th to the middle of the month placed the soil in good condition for seeding, and a great deal of this work was done.—*M. E. Blystone.*

Indiana.—The mean temperature was 66.8°, or 0.5° below normal; the highest was 98°, at Mount Vernon on the 8th, and the lowest, 29°, at Northfield and Winamac on the 19th. The average precipitation was 1.54 or 1.13 below normal; the greatest monthly amount, 3.19, occurred at Seymour, and the least, trace, at Veedersburg.

Showery conditions, with fairly good amounts of rainfall, prevailed in all sections from the 9th to the 16th, and over the central and southern sections on the 28th and 29th; the remainder of the month was practically rainless. Temperatures slightly above the seasonal average were recorded up to the 16th; during the period from the 17th to the 21st, inclusive, light to heavy frosts were general throughout the State, and during the last decade of the month the daily mean temperature averaged about 4° above normal. The bulk of the corn crop was advanced beyond the stage where it could be injured by frost before the frosts came, and most of it was in shock by the last of the month. The frosts cut short the tomato and cucumber crops. Fall plowing was well advanced at the end of the month, but wheat sowing was retarded by dry ground and the fear of insects should warm weather continue.—*W. T. Blythe.*

Iowa.—The mean temperature was 63.3°, or 1.0° below normal; the highest was 102°, at Sigourney on the 7th, and the lowest, 26°, at Atlantic and Logan on the 18th. The average precipitation was 4.77, or 1.76 above normal; the greatest monthly amount, 13.62, occurred at Fonda, and the least, 1.71, at Amana.

The month was favorable as to temperature and sunshine for bringing all crops to full maturity. Light to heavy frosts on 17th and 20th cut some tender plants in exposed localities, and in the Missouri Valley counties killed the blades in some fields of belated corn, but the damage was very light. Good progress has been made in plowing and fall seeding, and germination has been satisfactory, Pastures and potatoes improved by copious rains; winter apple crop in commercial orchards in southwest district better than anticipated.—*John R. Sage.*

Kansas.—The mean temperature was 69.1°, or about normal; the highest was 100°, at Frankfort on the 5th and Independence on the 7th, and the lowest, 29°, at Scott on the 19th and at Eureka Ranch and Hoxie on the 20th. The average precipitation was 3.09, or 0.28 above normal; the greatest monthly amount, 9.74, occurred at Ness City, and the least, 0.22, at Englewood.

The precipitation was above normal in the western half of the State, except in the extreme southern counties, and below in the eastern half, except a few of the central counties. Wheat seeding progressed rapidly, being finished in many counties. Early sown wheat and rye are up in all parts of the State. Corn cutting is nearly finished, and a fine crop of fodder is in the shock. The fourth crop of alfalfa is generally in the stack. Apple and peach crops are large; quality good. Pastures good. Stock water plentiful.—*T. B. Jennings.*

Kentucky.—The mean temperature was 68.1°, or 2.4° below normal; the highest was 98°, at Greensburg on the 4th, and the lowest, 33°, at Fords Ferry on the 19th. The average precipitation was 3.57, or 0.76 above normal; the greatest monthly amount, 6.49, occurred at Leitchfield, and the least, 1.06, at Scott.

The month was very favorable for agricultural interests. The first half was warm and generally dry, and crops matured rapidly. General rains fell from the 11th to the 16th and on the 17th and 21st. Frosts occurred on the 18th and 19th, but no damage resulted. Moderate temperatures prevailed during the remainder of the month.—*H. B. Hersey.*

Louisiana.—The mean temperature was 75.9°, or 0.7° below normal; the highest was 99°, at Minden and White Sulphur Springs on the 1st, and the lowest, 41°, at Mansfield on the 19th. The average precipitation was 3.91, or 0.25 above normal; the greatest monthly amount, 11.09, occurred at Alexandria, and the least, 0.41, at Prevost.

Showery weather during the first and second decades of the month proved injurious to cotton in nearly all localities. In some instances open cotton was beaten out onto the ground and there was much rotting and sprouting in the bolls. Dry weather during the last ten days of the month proved more auspicious, cotton opened rapidly, and picking was rushed. The yield is considerably below the average. The weather was all that could be desired for sugar cane, the cold weather in the third decade being just such as was needed to develop the sucrose content. Cane was very promising at the close of the month, and in some instances was ripening. The rice harvest was delayed by the wet weather prior to the 17th, but was about completed by the last of the month; the yield is, as a rule, very satisfactory. The corn crop was housed as rapidly as practicable.—*I. M. Cline.*

Maryland and Delaware.—The mean temperature was 66.4°, or 1.4° below normal; the highest was 95°, at Annapolis, Md., on the 15th, and the lowest, 29°, at Sunnyside, Md., on the 21st and at Deer Park, Md., on the 22d. The average precipitation was 3.00, or 0.28 below normal; the greatest monthly amount, 6.46, occurred at Bachmans Valley, Md., and the least, 1.33 at Distributing Reservoir, D. C.

A storm on the 15th was severe over parts of Frederick and Carroll counties, unroofing a number of houses, prostrating telephone lines, and washing grain fields, but this was the only unfavorable weather feature of the month. Dry and clear weather prevailed generally on the 4th to 9th, 21st to 27th, and 31st, with light to killing frosts during the middle period over the northern counties. The rainfall was sufficient and fairly well distributed. The general weather conditions were quite favorable for the corn harvest and other fall farm work. A good corn crop is assured, although much late corn was still green at the close of the month. Tomatoes had improved, and most garden vegetables yielded well, but potatoes continued short. Some late hay was made, tobacco was nearly all housed, and the peach season closed. Progress in fall seeding was irregular. Pastures were short at times, but revived at the close of the month.—*Oliver L. Fassig.*

Michigan.—The mean temperature was 60.5°, or about normal; the highest was 95°, at Alma on the 6th and at Jackson on the 7th, and the lowest, 20°, at Humboldt on the 18th. The average precipitation was 2.13, or 0.74 below normal; the greatest monthly amount, 5.90, occurred at Mancelona, and the least, 0.23, at Bay City.

Generally the weather conditions during September were very favorable for the maturing of late crops, but not so favorable for field work. The wet and cool weather extending throughout most of the second decade of the month delayed the maturing of sugar beets and late potatoes, and the harvesting of late beans and other field work, but the much drier and warmer weather of the last decade was very beneficial. At the close of the month corn, late beans, and buckwheat had been mostly secured in good condition; the corn crop was an exceptionally good one. Late potatoes had improved considerably and indicated a fair yield, while sugar beets were very promising. Fall plowing was nearly completed and wheat and rye seeding well advanced in the northern and central counties; in the southern counties very little seeding had been done, as in that section this work is usually delayed as late as possible to avoid the ravages of the hessian fly.—*C. F. Schneider.*

Minnesota.—The mean temperature was 57.3°, or 2.0° below normal; the highest was 95°, at Zumbrota on the 5th, and the lowest, 20°, at Pokegama Falls on the 19th. The average precipitation was 4.34, or 1.50 above normal; the greatest monthly amount, 9.76, occurred at St. Charles, and the least, 0.51, at Sandy Lake Dam.

There were rains in the northern part of the State on the 5th, from the 13th to the 17th, and on the 24th and 25th; and in middle and southern parts from the 6th to the 16th, and from the 24th to the end of the month. The temperature was high early in the month, with 90° reported on the 3d and 4th, and in southern portions on the 5th. The temperature was low on the 18th, 19th, and 20th, with killing frosts in the northern half, but with very little injury in the southern half up to the end of the month. Thrashing went on well in the north until the 13th, and for short periods after the 20th. In southern portions there was very little thrashing after the 7th because of the damp condition of the stacks. In the extreme north there were still small areas of uncut oats, barley, and buckwheat early in the month, and flax was not all cut at the end of the month. Corn generally escaped danger by frost, and all that was to be cut was in shock in good time. Potato digging was general late in the month, with a good crop reported in northern counties, but a very poor one in the south. Plowing has been going on since the rains moistened the soil, which was in splendid condition at the close of the month.—*T. S. Outram.*

Mississippi.—The mean temperature was 73.5°, or 2.1° below normal; the highest was 102°, at Windham on the 2d, and the lowest, 36°, at Aberdeen on the 19d. The average precipitation was 3.68, or 0.80 above

normal; the greatest monthly amount, 9.73, occurred at Austin, and the least, 1.19, at Hazelhurst.

The first eleven days of the month were favorable for all farming operations. Cotton opened rapidly and picking became general. From the 12th to the 17th, inclusive, cloudy and rainy weather prevailed over the entire State and was very damaging to cotton, causing it to rust, rot, and sprout in the bolls. The clear and much cooler weather which prevailed from the 18th to the 22d checked the rust on cotton, but retarded opening. The last week was fair and warm and picking was resumed, with indications of a much lighter yield than was anticipated at the opening of the month. Fodder pulling was generally completed during the first decade and haying was in full progress at the close of the month. On the whole, minor crops did well throughout the month.—*W. S. Belden.*

Missouri.—The mean temperature was 68.9°, or about normal; the highest was 103°, at Cook Station on the 8th, and the lowest, 27°, at Ironton and Potosi on the 19th. The average precipitation was 2.27, or 1.24 below normal; the greatest monthly amount, 7.31, occurred at Appleton City, and the least, 0.11, at Cook Station.

During the first week of September corn dried rapidly and cutting became general, the bulk of the crop being put in shock by the 15th. Frost on the 18th damaged the fodder on some late corn but did not injure the grain. Good rains in the northern and western counties during the second week put the ground in excellent condition for fall seeding, which progressed rapidly, but in some of the eastern and southern counties the ground continued so dry that but little wheat could be sown. In portions of the northern and western sections pastures improved considerably, but in many of the eastern counties they continued bare throughout the month. The rains were not heavy enough to materially increase the supply of stock water, except in a few localities.—*A. E. Hackett.*

Montana.—The mean temperature was 48.1°, or 4.1° below normal; the highest was 103°, at Glendive on the 2d, and the lowest, 15°, at Yale on the 19th. The average precipitation was 2.18, or 0.96 above normal; the greatest monthly amount, 5.61, occurred at St. Peters, and the least, 0.63, at Manhattan.

Unusually heavy rains occurred throughout the State on the 2d, 3d, and 4th, followed on the 6th by heavy snowstorms in the central portion along the Rocky Mountains. The greatest depth of snowfall in any twenty-four consecutive hours was 10 inches, at St. Peters. Snowstorms also occurred on the 24th at many stations in the central portion.—*E. J. Glass.*

Nebraska.—The mean temperature was 62.4°, or 1.2° below normal; the highest was 98°, at Nemaha on the 5th and the lowest, 20°, at Lynch on the 18th. The average precipitation was 4.55, or 2.61 above normal; the greatest monthly amount, 10.97, occurred at Hartington, and the least, 0.25, at Gordon.

The excessive rainfall thoroughly moistened the soil and was very favorable for seeding and for the germination and growth of winter wheat and rye. The acreage sown to winter wheat is unusually large and the present prospects are that the crop will obtain an exceptionally fine start this fall.—*G. A. Loveland.*

Nevada.—The mean temperature was 56.1°, or 3.3° below normal; the highest was 95°, at Tecoma on the 1st and 2d and at Wadsworth on the 18th, and the lowest, 20°, at Hamilton on the 23d. The average precipitation was 0.39, or 0.04 below normal; the greatest monthly amount, 1.38, occurred at Lewers Ranch, while none fell at several stations.

The weather throughout the month was very favorable for harvesting hay and grain, for digging potatoes, and for fall plowing. During early part of the month frost damaged tomatoes, cucumbers, potatoes, corn, etc., in various parts of the State.—*J. H. Smith.*

New England.—The mean temperature was 61.6°, or 1.3° above normal; the highest was 94°, at North Bridgeport, Me., on the 5th, and the lowest, 20°, at Flagstaff, Me., on the 26th. The average precipitation was 3.31, or 0.97 below normal; the greatest monthly amount, 6.60, occurred at Southington, Conn., and the least, 0.94, at Kineo, Me.

The weather of the month was very pleasant, and excepting parts of Connecticut which were visited by severe local storms, no damage resulted from the several elements. Crops were harvested in good condition and excellent progress was made in fall plowing and seeding. The mean temperature was in excess of the average but was evenly distributed through the month.—*J. W. Smith.*

New Jersey.—The mean temperature was 66.8°, or 0.5° above normal; the highest was 94°, at Indian Mills on the 15th, and the lowest, 29°, at Layton and Charlotteburg on the 26th. The average precipitation was 3.38, or 0.30 below normal; the greatest monthly amount, 6.82, occurred at Woodbine, and the least, 1.63, at Newark.

The weather conditions that prevailed during the month were generally favorable for the maturing and harvesting of all late crops. The first light frost of the season occurred on the morning of the 22d, and the first heavy on the morning of the 26th. At the close of the month the great bulk of the cranberry crop had been picked without injury from frost.—*E. W. McGann.*

New Mexico.—The mean temperature was 65.2°, or about normal; the highest was 100°, at San Marcial on the 1st, Mesilla Park on the 2d, and Carlsbad on the 24th, and the lowest, 26°, at Aztec and Blue-water on the 25th. The average precipitation was 1.35, or 0.17 below normal; the greatest monthly amount, 3.90, occurred at Lower Penasco, while none fell at Lordsburg, and only a trace at Engle and Olio.

A not unfavorable month is a very favorable season.—*R. M. Hardinge.*

New York.—The mean temperature was 61.4°, or 0.3° above normal; the highest was 93°, at Schenectady on the 6th, and the lowest, 19°, at Axton on the 26th. The average precipitation was 3.46, or about normal; the greatest monthly amount, 6.31, occurred at Volusia, and the least, 1.38, at Lyons.

The month of September was generally favorable both for the growth of crops and for the harvest, which was accomplished without material damage by frosts. The first frost occurred on the 9th, and general frosts on the 20th. Destructive frosts were more or less general on the 26th, but owing to the advanced stage of the harvest but little damage resulted. The ground continued in excellent condition, and seeding wheat and rye was mostly completed by the close of the month.—*R. G. Allen.*

North Carolina.—The mean temperature was 69.9°, or 0.5° below normal; the highest was 98°, at Southern Pines on the 13th, and the lowest, 31°, at Linville on the 20th. The average precipitation was 5.63, or 1.28 above normal; the greatest monthly amount, 9.59, occurred at Southern Pines, and the least, 2.29, at Oak Ridge.

The first half of September was dry and warm, and very favorable for farm work, especially for picking cotton and making hay; toward the end of the period drought began to prevail, which, however, was broken by the rainfall from the 16th to 19th. Unfortunately the amount of rain received was beyond the requirement of crops, and some injury resulted to open cotton and hay not yet housed. The latter part of the month was cool and wet, and no further development of vegetation took place. The precipitation from April to September was above the normal every month, and the accumulated excess amounts to no less than 15 inches for the State, surpassing all previous records for a similar period.—*C. F. von Herrmann.*

North Dakota.—The mean temperature was 53.6°, or 3.8° below normal; the highest was 100°, at Medora on the 2d, and the lowest, 12°, at Dunseith on the 18th. The average precipitation was 2.01, or 1.04 above normal; the greatest monthly amount, 5.66, occurred at Forman, and the least, 0.53, at Melville.

The weather was generally favorable for maturing late crops and for harvesting and thrashing. A severe freeze and killing frost on the 18th, the first of the season, destroyed all vegetation that had not ripened, including a little late corn and flax. While thrashing was somewhat interrupted by rains during the month, no serious delay occurred.—*B. H. Bronson.*

Ohio.—The mean temperature was 64.8°, or 0.8° below normal; the highest was 98°, at Jacksonboro on the 7th, and the lowest, 29°, Celina on the 19th. The average precipitation was 2.86, or 0.22 above normal; the greatest monthly amount, 7.38, occurred at Cleveland, and the least, 0.53, at New Paris.

September has been slightly cooler and wetter than normal, except that the drought continues in southwest counties. Frosts occurred on the 18th to 21st, doing some damage in the northwest. In the north late corn is now ripe and early corn is nearly all secured. Late potatoes continue growing in the northeast, in the other sections the crop is light. Tobacco is practically all housed in good condition. Only an occasionally correspondent states that a fair crop of winter apples is in prospect. Grapes have done fairly well. Much wheat has been sown, but many correspondents have delayed seeding to avoid damage by the fly.—*J. Warren Smith.*

Oklahoma and Indian Territories.—The mean temperature was 73.7°, or 0.4° below normal; the highest was 107°, at Ardmore, Ind. T., on the 12th, and the lowest, 32°, at Jefferson, Okla., on the 19th and at Jenkins, Okla., on the 20th. The average precipitation was 1.56, or 0.95 below normal; the greatest monthly amount, 4.24, occurred at Newkirk, Okla., and the least, trace, at Healdton, Ind. T.

The first part of the month was cool and showery, the latter part fair, warmer, and droughty. Light frost occurred on the 18th and 20th, with slight damage to vegetation. Cotton picking was about two-thirds completed with an average yield of about one-third bale per acre. Corn cutting was completed and husking was in progress. Kaffir corn, cane, and broom corn were being gathered with moderate yields. Pastures suffered and stock was in variable condition. Fall wheat seeding and plowing was about two-thirds completed, with early sown up to a good stand.—*Charles M. Strong.*

Oregon.—The mean temperature was 57.1°, or 2.2° below normal; the highest was 96°, at Junction City on the 16th and Buckhorn Farm on the 17th, and the lowest, 28°, at Silver Lake on the 9th. The average precipitation was 3.27, or 1.47 above normal; the greatest monthly amount, 8.73, occurred at Glenora, and the least, 0.34, at Vale.

The rains during the last decade were well distributed; they greatly improved the ranges and pastures and put the soil in excellent condition for fall plowing and seeding. Prunes were damaged considerably by wet weather, which also delayed the work of gathering them, but the crop as a whole was a fair one. The yield of hops was below expectations. Corn and potato yields were light. About three-fourths of a crop of apples will be harvested.—*Edward A. Beals.*

Pennsylvania.—The mean temperature was 63.6°, or 0.4° above normal;

the highest was 95°, at Hawthorn on the 6th, and the lowest, 29°, at Center Hall on the 20th and at Dyberry on the 26th. The average precipitation was 3.39, or 0.22 above normal; the greatest monthly amount, 6.61, occurred at Oil City, and the least, 1.64, at Wilkesbarre.

September was seasonal in temperature, sunshine, and precipitation, and no damaging frosts occurred. These conditions made the month unusually favorable for the growth, maturing, and harvesting of ripened crops. At its close considerable corn had been put in shock, a large portion of the tobacco crop safely housed, and the harvesting of buckwheat well advanced. Late potatoes had made good growth, and while there were many complaints of rot, the prospect for a good yield was much improved. Peaches, plums, and pears were fairly plentiful and generally good, but apples were a failure. A large acreage was ready for fall seeding, and in some sections seeding was well advanced. Most pastures were in good condition. Considerable damage by caterpillars was reported during the month.—*T. F. Townsend.*

Porto Rico.—The mean temperature was 79.9°, or about normal; the highest was 100°, at Cayey and Coamo, and the lowest, 58°, at Adjuntas. The average precipitation was 10.77, or 3.40 above normal; the greatest monthly amount, 20.82, occurred at Adjuntas, and the least, 4.73 at Ponce.

All crops, especially the rice crop, were more or less damaged by a storm on the night of the 11th and the morning of the 12th. The high winds did considerable injury to advanced canes, banana and plantain trees, coffee, and corn, while the accompanying heavy rains overflowed the streams doing much harm to the smaller crops on the low lands and retarding field work. The storm, however, was followed by favorable weather and growing crops rapidly recovered from the effects of the storm. Much work was done during the month in preparing the land and in planting gran cultura, corn, beans, sweet potatoes, tobacco seeds, and other smaller crops. The harvesting of rice and corn and the picking of coffee have been carried on with activity during the month, and the yield seems to be satisfactory both in quality and quantity, the corn crop being particularly good. There has been an abundance of ground provisions, fruits, and vegetables, except in a very few localities where a temporary scarcity of certain articles prevailed. Pasturage has been abundant and excellent.—*E. C. Thompson.*

South Carolina.—The mean temperature was 73.1°, or 1.1° below normal; the highest was 98°, at Gillisonville on the 14th, and the lowest, 46°, at Walhalla on the 19th and at Santuc on the 22d. The average precipitation was 4.66, or 0.25 above normal: the greatest monthly amount, 8.40, occurred at Cheraw, and the least, 0.30, at Bowman.

Although the temperature averaged below normal, it was, nevertheless, quite favorable. The gathering of crops was interrupted by but one period of wet weather, during which excessive rains occurred over the northeastern, central, and western portions, and damaged hay in the process of curing, and also open cotton. A severe drought prevailed in the southeastern portion, injuring truck and sea island cotton. Maturing crops were harvested in good condition, but the yields of the staple crops are disappointing.—*J. W. Bauer.*

South Dakota.—The mean temperature was 58.5°, or 4.0° below normal; the highest was 99°, at Ashcroft on the 2d, and the lowest, 17°, at Bowdle on the 17th and Rochford on the 18th. The average precipitation was 4.88, or 3.55 above normal; the greatest monthly amount, 12.41, occurred at Vermillion, and the least, 0.68, at Spearfish.

During the early part of the first decade the weather was favorable for field work and the maturing of late crops. During most of the remainder of the month rains were frequent, greatly retarding thrashing, the completion of flax harvest, corn cutting, and general field work, and causing grain and hay in stack and some grain yet in shock to sprout and mold, and also damaging considerable hay and flax in bunch. The rainfall of the month was unusually heavy over the greater portion of the east half of the State. A southerly gale prevailed over the eastern portion on the 24th, damaging a number of windmills and grain stacks; and in the late afternoon and evening of that day winds of apparently tornadic nature damaged some buildings in the western portion of Beadle County and the northern portion of Spink County. Near Turton, in the latter county, one man was killed and another injured during the storm by flying timbers. The first general heavy and killing frosts occurred on the 17th and 18th, but the damage was confined to vines, some corn fodder, and a little of the latest corn. The damage to the late corn was slight because the crop was practically beyond danger of injury by frost.—*S. W. Glenn.*

Tennessee.—The mean temperature was 68.4°, or 2.1° below normal; the highest was 96°, at Ashwood on the 7th, and the lowest, 34°, at Elizabethton, Rugby, Silverlake, Erasmus, and Waynesboro on the 19th. The average precipitation was 3.82, or 0.94 above normal; the greatest monthly amount, 8.05, occurred at Tullahoma, and the least, 1.30, at Peryear.

Fair and pleasant weather prevailed during the first decade of the month; a rainy period occurred from the 12th to the 17th, inclusive, and was followed by another ten days of fine weather; on the 28th and 29th general rains again fell. Some damage was caused by heavy, washing rains on the 13th and 14th. On the whole, the month was very favorable for farm work. A fine tobacco crop was nearly all housed and curing begun, and cotton picking progressed under very favorable conditions during most of the month. Large quantities of fodder and various kinds of hay (such as millet, peavine, and crab grass) were saved. The planting of wheat was well advanced by the close of the month and the soil was in fine condition to receive seed.—*H. C. Bate.*

Texas.—The mean temperature was 77.4°, or about normal; the highest was 107°, at Fort Ringgold on the 10th, and the lowest, 40°, at Anna and Kerrville on the 21st. The average precipitation was 3.38, or 0.05 above normal; the greatest monthly amount, 12.25, occurred at Brazoria, and the least, trace, at Bastrop.

Hot, dry weather prevailed throughout the State at the beginning of the month, and all farming interests were being seriously affected by the drought which had continued unbroken since early in August. The situation was effectually relieved by heavy rains which occurred near the middle of the month, and all crops that were not too far gone to be benefited showed a marked improvement. During the last decade a sharp norther swept over the entire State, and temperatures almost low enough for the formation of frost occurred, except in the immediate coast districts. At the close of the month early sown wheat and oats were beginning to show above ground, and a few stands were reported. Late gardens were doing fairly well. Rice was heading and in some localities the crop was being harvested. Cotton picking was well advanced, and many fields had been picked and were abandoned to stock. Late cotton was backward, and only in a few instances was the crop worth the picking.—*Edward H. Bowie.*

Utah.—The mean temperature was 59.3°, or 1.8° below normal; the highest was 100°, at Green River on the 11th and St. George on the 15th and 18th, and the lowest, 11°, at Loa on the 24th. The average precipitation was 0.21, or 0.58 above normal; the greatest monthly amount, 1.03, occurred at Logan, while none fell at 18 stations.

The month was a favorable one for haying, harvesting, and thrashing, but unfavorable for plowing, the ground generally being too dry for that purpose.—*L. H. Murdoch.*

Virginia.—The mean temperature was 67.2°, or 2.7° below normal; the highest was 95°, at Petersburg on the 15th, and the lowest, 31°, at Burkes Garden on the 21st. The average precipitation was 3.82, or 0.10 above normal; the greatest monthly amount, 6.87, occurred at Newport News, and the least, 1.38, at Alexandria.

The weather was in all respects favorable for the growth and maturity of crops. Tobacco cutting progressed rapidly during the first two weeks. Early corn matured by the middle of the month. Cutting about complete by the end of the month.—*R. F. Young.*

Washington.—The mean temperature was 55.6°, or 2 2° below normal; the highest was 98°, at Pasco on the 1st, and the lowest, 22°, at Cle Elum on the 30th. The average precipitation was 2.32, or 0.27 above normal; the greatest monthly amount, 6.60, occurred at Clearwater, and the least, 0.29, at South Ellensburg.

Generally cool, but with a warm period from the 16th to 19th. Early part of month was favorable for harvesting and thrashing. Frequent showers during latter part delayed thrashing, but put the ground in good condition for plowing and fall wheat seeding.—*G. N. Salisbury.*

West Virginia.—The mean temperature was 64.8°, or 2.7° below normal; the highest was 95°, at New Martinsville on the 6th, and the lowest, 27°, at Philippi on the 20th. The average precipitation was 3.35, or 0.40 above normal; the greatest monthly amount, 7.64, occurred at Williamson, and the least, 1.46, at Old Fields.

The weather during the month was favorable for maturing crops and for farm work. During the second week showers fell almost every day and put the ground in good condition for working, and also greatly benefited fall pastures. While frost occurred during the third week, practically no damage was done. At the close of the month corn cutting was nearly completed, with better results than anticipated; potatoes were being dug, average yield; buckwheat was about all harvested and was being thrashed, good yield; pastures were in fair condition and stock doing well; apples were wormy and mostly gathered, light yield.—*E. C. Vose.*

Wisconsin.—The mean temperature was 59.4°, or 1.1° below normal; the highest was 97°, at Barron on the 5th, and the lowest, 26°, at Osceola on the 18th and Grantsburg on the 20th. The average precipitation was 4.23, or 0.96 above normal; the greatest monthly amount, 10.04, occurred at Pepin, and the least, 1.70, at Chilton.

Weather conditions during the month very favorable for fall work and standing crops continued to improve, with very little damage from frost. Late potato crop especially benefited by favorable conditions. Rain general and well distributed. Temperature during the first decade moderately high, followed by much cooler weather, which culminated on the 18th and 20th, when the temperature fell to near the freezing point in nearly all portions of the State. General conditions very favorable.—*J. W. Schaeffer.*

Wyoming.—The mean temperature was 53.3°, or 3.0° below normal; the highest was 94°, at Alcova on the 2d, and the lowest, 12°, at Leo on the 17th and at Bitter Creek on the 25th. The average precipitation was 0.54, or 0.28 below normal; the greatest monthly amount, 2.85, occurred at Fort Yellowstone, and the least, trace, at Alcova and Casper.

Over most of the agricultural sections of the State killing frosts did not occur before the middle of the month, thus allowing crops to fully mature. Winter pasturage over nearly all sections is good and stock in best of condition for the coming winter.—*W. S. Palmer.*

SPECIAL CONTRIBUTIONS.

CLIMATOLOGY OF COSTA RICA.

Communicated by H. PITTIER, Director, Physical Geographic Institute.

TABLE 1.—*Hourly observations at the Observatory, San Jose de Costa Rica, during September*, 1901.

Hours.	Pressure.		Temperature.		Relative humidity.		Rainfall.		
	Observed, 1901.	Normal, 1889-1900.	Observed, 1901.	Normal, 1889-1900.	Observed, 1901.	Normal, 1889-1900.	Observed, 1901.	Normal, 1889-1900.	Duration, 1901.
	660+ *Mm.*	660+ *Mm.*	° *C.*	° *C.*	%	%	*Mm.*	*Mm.*	*Hrs.*
1 a. m.	4.00	3.53	17.61	17.31	94	94	1.1	0.7	2.83
2 a. m.	3.59	3 13	17.34	17.11	94	94	1.9	0.4	2 50
3 a. m.	3.35	2.88	17.05	16.91	93	94	4.3	0.6	2.92
4 a. m.	3.29	3.89	16.85	16.78	93	94	2.9	0.5	2.50
5 a. m.	3.46	3.07	16.88	16.62	92	94	1.4	0.3	2.00
6 a. m.	3.71	3.43	16.71	16.56	92	93	1.1	0.2	0.83
7 a. m.	4.01	3.79	18.04	18.25	89	88	0.9	0.1	1.00
8 a. m.	4.36	4.09	20.00	20.09	80	80	1.0	0.0	0.50
9 a. m.	4.62	4.19	22 22	22.27	72	73	1.1	0.1	0.83
10 a. m.	4.73	4.26	23.94	24.01	68	68	4.1	0.0	1.00
11 a. m.	4.36	4.06	25.22	24.80	66	68	3.8	0.5	1.17
12 m.	3.80	3.57	25.10	25.09	67	69	4.5	3.6	1.75
1 p. m.	3.30	2.97	24.93	24.61	68	71	12.0	15.7	2.25
2 p. m.	2.93	2.61	23.82	23.57	76	76	22.2	25.1	5.76
3 p. m.	2.59	2.32	22.43	22.28	81	81	41.4	28.1	6.34
4 p. m.	2.63	2.38	21.10	20.86	87	85	79.4	56.8	10.24
5 p. m.	2.80	2.65	20.16	20.14	88	88	60.5	55.1	10.75
6 p. m.	3 37	3.08	19.43	19.36	93	91	41.9	46.1	13.26
7 p. m.	3.84	3.50	19 03	18.85	95	92	41.0	39.6	10.51
8 p. m.	4.26	3.81	18.79	18.53	95	93	47.6	21.3	10.51
9 p. m.	4.61	4.20	18.57	18 28	95	92	32.9	13.7	6.91
10 p. m.	4.74	4.30	18.29	17.95	96	92	9.0	7.4	6.01
11 p. m.	4.68	4.20	18.08	17.73	96	93	9.1	3.2	5.50
Midnight	4.32	3.89	17.79	17.45	95	93	6.7	1.3	3.75
Mean	663.81	663.45	19.97	19.81	86	86	.....	.....	.....
Minimum	661.60	659.53	13.8	13.3	55	.....	.....	.....	.....
Maximum	666.20	666.32	29.8	30.0	100	.....	39.6	.....	.....
Total	.....	.....	.....	.....	.....	.....	431.8	320.2	111.62

REMARKS.—The barometer is 1,169 meters above sea level. Readings are corrected for gravity, temperature, and instrumental error. The dry and wet bulb thermometers are 1.5 meters above ground and corrected for instrumental errors. The hourly readings for pressure, wet and dry bulb thermometers, are obtained by means of Richard registering instruments, checked by direct observations every three hours from 7 a. m. to 10 p. m. The hourly rainfall is as given by Hottinger's self-register, checked once a day. Under maximum, the greatest hourly rainfall for the month is given. The standard rain gage is 1.5 meters above ground. In the Costa Rican system the an Jose local time is used, which is $0^h\ 36^m\ 13^s$ slower than seventy-fifth meridian time.

TABLE 2.

Time.	Sunshine.		Temperature of the soil at depth of—					Cloudiness observed, 1901.
	Observed, 1901.	Normal, 1889-1.00.	0.15 *m.*	0.30 *m.*	0.60 *m.*	1.20 *m.*	3.00 *m.*	
	Hours.	*Hours.*	° *C.*	° *C.*	° *C.*	° *C.*	° *C.*	%
7 a. m.	8.26	9.36	21.48	21.73	21.98	21.68	21.67	59
8 a. m.	18.99	20.35	.....	.....	.....	.....	.....	.....
9 a. m.	21.25	22.20	.....	.....	.....	.....	.....	.....
10 a. m.	21.33	22.07	21.74	22.10	22.08	21.75	.....	58
11 a. m.	18.41	20.07	.....	.....	.....	.....	.....	.....
12 m.	16.67	16.40	.....	.....	.....	.....	.....	.....
1 p. m.	11.58	12.48	22.31	21.96	22.79	21.74	.....	76
2 p. m.	10.91	11.75	.....	.....	.....	.....	.....	.....
3 p. m.	7.75	8.65	.....	.....	.....	.....	.....	.....
4 p. m.	3.83	4.50	22.31	21.99	23.35	21.71	.....	92
5 p. m.	2.57	2.08	.....	.....	.....	.....	.....	.....
6 p. m.	0.08	0.51	.....	.....	.....	.....	.....	.....
7 p. m.	.....	.....	22.20	21.97	21.67	21.68	.....	93
8 p. m.	.....	.....	.....	.....	.....	.....	.....	.....
9 p. m.	.....	.....	.....	.....	.....	.....	.....	.....
10 p. m.	.....	.....	22.02	21.96	21.96	21.67	.....	77
11 p. m.	.....	.....	.....	.....	.....	.....	.....	.....
Midnight	.....	.....	.....	.....	.....	.....	.....	.....
Mean	.....	.....	22.03	21.93	22.09	21.66	21.67	76
Total	141.63	150.42	.....	.....	.....	.....	.....	.....

Notes on the weather.—At San Jose the pressure, temperature, and relative humidity have varied but slightly from the normal for the month. Rain has been rather excessive on the Pacific slope and on the mountains of the interior, while drought has prevailed on the coast belt of the Caribbean Sea.

Notes on earthquakes.—September 8, 6:10 p. m., slight movement, north-northeast to south-southwest, intensity II, duration eleven seconds; ended with a strong and sudden shock. September 13, 12:07 p. m., slight tremors, east-northeast to west-southwest, intensity I, duration four seconds. September 28, 8:45 a. m.; slight tremors, east-northeast to west-southwest, intensity I, duration three seconds.

TABLE 3.—*Rainfall at stations in Costa Rica, September*, 1901.

Stations.	Amount.	No. rainy days.	Stations.	Amount.	No. rainy days.
	Mm.			*Mm.*	
1. Sipurio (Talamanca)	260	18	14. Juan Vinas	74	12
2. Boca Banano	60	14	15. Santiago	157	22
3. Limon	.....	.....	16. Paraiso	186	18
4. Swamp Mouth	96	8	17. Las Concavas	213	17
5. Zent	76	11	18. Cartago	229	23
6. Gute Hoffnung	129	5	19. Tres Rios	517	27
7. Siquirres	201	19	20. S. Francisco G	499	28
8. Guapiles	340	17	21. San Jose	432	28
9. Sarapiqui	404	26	22. La Verbena	556	24
10. San Carlos	257	19	23. Nuestro Amo	336	28
11. Las Lomas	.....	.....	24. Alajuela	388	25
12. Peralta	252	17	25. San Isidro Alajuela	822	26
13. Turrialba	133	18			

Not reported previously.

Stations.	July.		August.	
	Mm.		*Mm.*	
Swamp Mouth	.....	.....	35	6
Zent	209	19	84	13
Siquirres	.....	.....	174	15
Turrialba	.....	.....	196	17

MEXICAN CLIMATOLOGICAL DATA.

Through the kind cooperation of Señor Manuel E. Pastrana, Director of the Central Meteorologic-Magnetic Observatory, the monthly summaries of Mexican data are now communicated in manuscript, in advance of their publication in the Boletin Mensual. An abstract, translated into English measures, is here given, in continuation of the similar tables published in the MONTHLY WEATHER REVIEW since 1896. The barometric means are now reduced to standard gravity.

Mexican data for September, 1901.

Stations.	Altitude.	Mean barometer.	Temperature.			Relative humidity.	Precipitation.	Prevailing direction.	
			Max.	Min.	Mean.			Wind.	Cloud.
	Feet.	*Inch.*	° *F.*	° *F.*	° *F.*	%	*Inch.*		
Chihuahua	4,669	25.26	84.2	53.6	73 2	66	1.95	.....	.....
Guadalajara (Obs. del. Est.)	5,186	24.87	80.6	56.3	70.2	77	9.78	sse.	.....
Guanajuato	6,640	23.62	87.3	47.1	66.6	66	9.53	ene.	.....
Leon (Guanajuato)	5,906	24 22	84.4	46.6	67.3	76	7.51	se.	ne.
Mazatlan	25	29.76	92.1	72.7	84.0	78	8.60	nw.	.....
Mexico (Obs. Cent.)	7,472	22.98	77.2	46.8	61.5	73	5.57	n.	.....
Monterrey (Sem)	1,626	28.11	99.5	55.9	77.0	72	10.74	.....	.....
Morelia (Seminario)	6,401	23.89	75.9	49.8	58.5	80	7.19	sse.	.....
Puebla (Col. Cat.)	7,125	23.31	77.0	48 6	64.6	76	9.65	ene.	.....
Queretaro	6,070	24.13	82.4	46.9	66.2	70	3.56	e.	sw.
S Isidro (Hac.de Gto)	.....	.....	77.0	64.4	.....	.....	10.66	.....	.....
Toluca	8,812	21.90	72.7	38.1	57.9	77	4.97	s.	.....
Zapotlan	5,078	25.00	82.8	56.3	69.3	72	10.37	sse.	.....

* Reduced to standard temperature and gravity.

HAWAIIAN CLIMATOLOGICAL DATA.

By CURTIS J. LYONS, Territorial Meteorologist.

GENERAL SUMMARY FOR SEPTEMBER, 1901.

Temperature mean for the month, 77.2°; normal, 77.5°; average daily maximum, 84.1°; average daily minimum, 71.1°; average daily range, 13.0°; greatest daily range, 18°; least daily range, 8°; highest temperature, 86°; lowest, 66°.

Barometer average, 29.959; normal, 29.970 (corrected for gravity by —.06); highest, 30.07, on the 1st; lowest, 29.85, on the 30th; greatest 24-hour change, .07 (20th p. m. to 21st p. m.); "lows" on the 21st and 30th; "highs," 1st and 19th. This is the sixth successive month of barometer lower than normal.

Relative humidity, 69.4 per cent; normal, 68.4; mean dew point, 66.5; normal, 66.3; mean absolute moisture, 7.12 grains to the cubic foot; normal, 7.06.

Rainfall, 0.85 inches; normal, 2.04; rain record days, 17; normal, 18; greatest rainfall in one day, 0.12, on the 14th; total at Luakaha, 7.17; at Kapiolani Park, 0.15. Total rainfall since January 1, 24.82; normal, 24.78.

The artesian well water stands at 32.20 feet above mean sea level. This is 0.35 foot higher than at the same date in 1900.

The average daily mean sea level for September was 10.46 feet on the scale, 10.00 representing the assumed annual mean, and 9.82 the actual mean for nine years previous to 1901. The lowest monthly mean during that period was 9.45, 10.46 as above being the highest.

Trade wind days, 24 (2 of north-northeast), normal for September, 26; average force (during daylight) Beaufort scale, 2.4. Cloudiness, tenths of sky, 3.9; normal, 4.0. No northerly upper currents.

Approximate percentages of district rainfall as compared with normal: Hilo, 42 per cent; Hamakua, 16; Kohala, 20; Waimea, 35; Kona, 120; Kau, 70; Puna, 80. Maui: Wailuku, 20; Makawao, 120. Oahu, 57. North Kauai, 50; South Kauai, 90 per cent. The drought in North Hawaii, also on the Maui Isthmus is still serious, and the forest fires are not yet extinguished. Rains will probably set in before the end of October.

Mean temperatures: Pepeekeo, Hilo district, 100 feet elevation, average maximum, 80.4; average minimum, 70.2; Waimea, Hawaii, 2,730 elevation, 78.2 and 65.3; Kohala, 521 feet elevation, 83.4 and 71.4; Kulaokahua, W. R. Castle's 60 feet elevation, highest, 88; lowest, 67; mean, 77.1; Ewa Mill, 50 feet elevation, 88 average maximum and 71 average minimum; probable mean, 78.5.

No heavy surf reported during the month excepting moderately heavy on 12th and 13th.

No lightning nor earthquakes reported. The last vestige of snow on Mauna Kea as seen from Hilo has disappeared.

Rainfall data for the Hawaiian Service.

Stations.	Elevation.	Sept., 1901.
HAWAII.		
HILO, e. and ne.	*Feet.*	*Inches.*
Waiakea	50	4.69
Hilo (town)	100	4.15
Kaumana	1,250	9.87
Pepeekeo	100	5.07
Hakalau	200	.....
Honohina	300	.....
Laupahoehoe	500	.....
Ookala	400	0.58
HAMAKUA, ne.		
Kukalau	250	0.38
Paauilo	750	0.45
Paauhau Mill (Gibb)	300	0.34
Paauhau (Greig)	1,150	.....
Honokaa (Muir)	425	0.47
Honokaa (Rickard)	1,900	.....
Kukuihaele	700	0.45
KOHALA, n.		
Awini Ranch	1,100	.....
Niulii	200	0.65
Kohala (Mission)	521	0 64
Kohala (Sugar Co.)	235	0.61
Hawi	300	.....
Hawi Mill	600	.....
Waimea	2,720	0.44
KONA, w.		
Kailua	950	4.98
Holualoa	1,350	4.12
Kealakekua	1,580	8.44
Napoopoo	25	.....
KAU, se.		
Kakuku Ranch	1,680	2.41
Honuapo	15	0.57
Naalehu	650	2.01
Hilea	310	1.90
Pahala	850	4.29
Moaula	1,700	7.03
PUNA, e.		
Volcano House	4,000	4.05
Olaa	1,700	8.37
Olaa	.....	.....
Kapoho	110	4.77
Kalapana, se	8	.....
MAUI.		
Olowalu	.....	.....
Lahaina	.....	.....
Waiopae Ranch, s	700	0.44
Kaupo (Mokulau), s	285	3.83
Kipahulu, s	300	4.99
Hamoa Plantation, se	60	.....

Stations.	Elevation.	Sept., 1901.
MAUI—*Continued.*	*Feet.*	*Inches.*
Nahiku, ne	60	5.43
Nahiku, ne	800	6.46
Haiku, n	700	2.62
Kula (Erehwon), n	2,700	0.41
Puuomalei, n	1,400	.....
Paia, n	180	0.63
Haleakala Ranch, n	2,000	0.98
Wailuku	200	0.12
LANAI.		
Keomuku, e	6	.....
OAHU.		
Punahou (W. B.), sw	47	0.85
Kulaokahua, sw	50	0.47
Makiki Reservoir	120	1.19
Kewalo (King street), sw	15	0.49
United States N. S., sw	6	0.45
Kapiolani Park, sw	10	0.15
Manoa (Woodlawn Dairy), c	285	6.07
Makiki Reservoir	.....	.....
School street (Bishop), sw	50	1.42
Pacific Heights, sw	700	3.03
Insane Asylum, sw	30	1.19
Kalihi-uka	260	4.00
Kamehameha School	75	1.17
Nuuanu (W. W. Hall), sw	50	1.14
Nuuanu (Wyllie street), sw	250	3.29
Nuuanu (Elec. Station), sw	405	4.29
Nuuanu (Luakaha) c	850	7.17
Waimanalo, ne	25	0.83
Maunawili, ne	300	1.87
Kaneohe, ne	100	.....
Ahuimanu, ne	350	2.79
Kahuku, n	25	1.17
Waialua, n	20	0.21
Wahiawa, c	900	.....
Ewa Plantation, s	60	0.97
Waipahu, s	200	0.10
Moanalua, sw	15	1.38
KAUAI.		
Lihue (Grove Farm), e	200	2.34
Lihue (Molokoa), e	300	2.75
Lihue (Kukaua), e	1,000	6.11
Kealia, e	15	1.87
Kilauea, ne	325	2.89
Hanalei, n	10	3.15
Waiawa, sw	32	1.21
Eleele, s	200	.....
Waiawa, Mountain, s	2,100	.....
McBrides (Res.)	.....	.....

Records not hitherto published, August, 1901.

Kapiolani Park	.....	0.15	Honohina	.....	7.25
Kewalo	.....	0.50	Laupahoehoe	.....	8.10
Honokaa (Rickard)	.....	0.61	Kula (Erehwon)	.....	0.35
Kohala Sugar Company	.....	0.58	Kealia	.....	0.99
Hakalau	.....	6.79			

NOTE.—The letters n. nw. e. sw. se. no. and s. attached to each name indicate the exposure or direction toward which localities face; "c," central locality.

Meteorological Observations at Honolulu, September, 1901.

The station is at 21° 18′ N., 157° 50′ W.

Hawaiian standard time is 10h 30m slow of Greenwich time. Honolulu local mean time is 10h 31m slow of Greenwich.

Pressure is corrected for temperature and reduced to sea level, and the gravity correction, —0.06, has been applied.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 12, or Beaufort scale. Two directions of wind, or values of wind force, or amounts of cloudiness, connected by a dash, indicate change from one to the other.

The rainfall for twenty-four hours is measured at 9 a. m. local, or 7.31 p. m., Greenwich time, on the respective dates.

The rain gage, 8 inches in diameter, is 1 foot above ground. Thermometer, 9 feet above ground. Ground is 43 feet, and the barometer 50 feet above sea level.

Date.	Pressure at sea level.	Temperature.		During twenty-four hours preceding 1 p. m. Greenwich time, or 2:30 a. m. Honolulu time.									Total rainfall at 9 a. m., local time.
				Temperature.		Moisture.		Wind.		Average cloudiness.	Sea-level pressures.		
		Dry bulb.	Wet bulb.	Maximum.	Minimum.	Dew-point.	Relative humidity.	Prevailing direction.	Force.		Maximum.	Minimum.	
	*	†	†			‡	‡			§			
1	30.01	75	70.5	85.5	77	66.7	63	ne.	4-5	4-2	30.07	30.00	0.01
2	29.99	76	67	84	75	66.0	66	ne.	4-2	5-2	30.07	30.01	0.00
3	30.00	77	69.5	84	76	64.5	61	ne.	2-4	3	30.04	29.94	0.00
4	29.94	76	72	84	75	68.0	70	ne.	4-3	5	30.01	29.93	0.10
5	30.00	74	72	86	75	70.3	75	ne.	3	6-2	30.03	29.94	0.10
6	29.99	73	71	86	74	69.5	73	ne.	3	4	30.05	29.96	0.03
7	29.98	76	70	86	71	68.5	72	ne.	3	3	30.03	29.96	0.01
8	29.97	70	67.5	85	75	67.3	66	ne.	3-1	2	30.01	29.94	0.00
9	29.96	74	69	85	69	65.7	68	ne.	3-4	2	30.00	29.92	0.06
10	29.95	69	66	84	69	65.0	64	ne.	3	4	30.00	29.90	0.00
11	29.96	73	67.5	84	69	65.0	67	ne.	3-2	6	30.02	29.94	0.01
12	29.96	76	68.5	85	73	64.3	62	ne.	3	3	30.01	29.94	0.00
13	29.97	74	68.5	85	75	65.0	61	ne.	4	4	30.00	29.93	0.06
14	29.94	74	69	83	71	66.0	69	ne.	3	6	30.00	29.93	0.12
15	29.95	75	69	83	72	67.3	72	ne.	3	5	30.00	29.93	0.06
16	29.95	69	65.5	84	73	64.0	61	ne.	2	2	30.01	29.94	0.00
17	29.94	67	65	82	68	66.0	76	s.	1	2-5	29.99	29.90	0.00
18	29.94	70	67	84	66	64.5	72	se-n.	1	4-2	29.98	29.89	0.00
19	29.94	77	71.5	84	67	66.5	70	se-ne.	2	1-5	29.98	29.89	0.12
20	29.97	76	70	85	73	68.3	70	ne.	3-4	4	30.02	29.94	0.03
21	29.93	71	68	84	74	65.5	63	ne.	3	3	30.00	29.93	0.02
22	29.92	73	69.5	81	70	67.0	76	nne.	2-0	8-3	29.96	29.86	0.01
23	29.93	75	68	84	69	67.0	69	ne.	1-3	5-2	29.97	29.89	0.00
24	29.92	73	68	83	75	64.0	62	ne.	3	8-3	29.97	29.89	0.00
25	29.96	76	69.5	84	69	66.5	69	ene-nne.	2-3	5-10	29.99	29.92	0.01
26	29.95	71	68	84	72	66.0	64	ne.	3-4	3	30.01	29.91	0.00
27	29.95	72	70	84	69	67.0	75	ne.	3-0	4	30.00	29.91	0.08
28	29.95	69	67.5	84	69	68.5	78	se-sw.	1	4-8	29.99	29.90	0.00
29	29.94	67	63.5	83	68	68.5	78	w.	1	9-3	30.00	29.93	0.02
30	29.91	69	67	84	66	66.0	75	n-s.	1	0-3	29.97	29.88	0.00
Sums.	.....	.....	.....	...	...	.....	.....	.....	.....	.....	.....	.....	0.85
Means.	29.968	72.9	68.3	84.1	71.1	66.5	69.4	.....	2.4	3.9	30.006	29.925	.....
Departure..	—.011	.....	.....	.....	.....	+0.2	+1.0	.....	.....	—0.1	.....	.....	—1.19

*This pressure is as recorded at 1 p. m., Greenwich time. †These temperatures are observed at 6 a. m., local, or 4:31 p. m., Greenwich time. ‡These values are the means of (6+9+2+9) ÷ 4. §Beaufort scale.

Mean temperature for September, 1901 (6+2+9) ÷ 3 = 77.2; normal is 77.5. Mean pressure for September, 1901 (9+3) ÷ 2 = 29.959; normal is 29.970.

CLIMATOLOGICAL DATA FOR JAMAICA.

Through the kindness of Mr. Maxwell Hall, the following data are offered to the MONTHLY WEATHER REVIEW in advance of the publication of the regular monthly weather report for Jamaica:

Jamaica, W. I., climatological data, September, 1901.

	Negril Point Lighthouse.	Morant Point Lighthouse.
Latitude (north)	18° 15′	17° 55′
Longitude (west)	78° 23′	76° 10′
Elevation (feet)	33	8
Mean barometer 7 a. m.	29.884	29.884
Mean barometer 3 p. m.	29.829	29.841
Mean temperature 7 a. m	80.1	.....
Mean temperature 3 p. m	84.0	.....
Mean of maxima	86.8	.....
Mean of minima	74.8	.....
Highest maximum	90.0	.....
Lowest minimum	71.0	.....
Mean dew-point 7 a. m	74.7	.....
Mean dew-point 3 p. m	74.3	.....
Mean relative humidity 7 a. m.	84.0	.....
Mean relative humidity 3 p. m.	73.0	.....
Total rainfall (inches)	15.69	8.23
Average wind direction 7 a. m	se.	var.
Average wind direction 3 p. m	se.	var.
Average hourly velocity, miles 7 a. m	11.7	6.4
Average hourly velocity, miles 3 p. m	11.8	10.6
Average cloudiness (tenths):		
7 a. m. Lower clouds	1.9	1.7
7 a. m. Middle clouds	3.3	2.1
7 a. m. Upper clouds	1.9	1.0
3 p. m. Lower clouds	2.8	2.2
3 p. m. Middle clouds	5.6	2.4
3 p. m. Upper clouds	0.5	1.2

NOTE.—The pressures are reduced to standard temperature and gravity, to the Kew standard, and to mean sea level. The thermometers are exposed in Stevenson screens.

Comparative table of rainfall for September.

(Based upon the average stations only.)

Divisions.	Relative area.	Number of stations.	Rainfall. Average.	Rainfall. 1901.
Northeastern division	25	21	11.34	8.34
Northern and subcentral division	22	55	6.34	5.47
Western-central division	26	24	12.80	10.26
Southern division	27	32	11.92	6.37
General means	100	132	10.60	7.61

In taking the average rainfall Mr. Hall uses only those stations for which he has several years of observation, so that the column of averages represents fairly well the normal rainfall for each division, while the column for the current month represents the average rainfall at those same stations. The relative areas of the divisions are very nearly the same and are given in the preceding table as expressed in percentages of the total area of Jamaica. The number of rainfall stations utilized in each area varies slightly from month to month, according as returns have come in promptly or not, but will not differ greatly from the numbers in the second column of the table.

RECENT PAPERS BEARING ON METEOROLOGY.

W. F. R. PHILLIPS, in charge of Library, etc.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau:

Journal of the Franklin Institute. Philadelphia. Vol. 152.
Pawling, Jesse. Notes on Magnetic Curves. Pp. 269–275.
—— Use of Kites in Meteorological Work. Pp. 313–314.
Stradling, George Flowers. Recent Advances in the Physics of Water. Pp. 257–268.

Scientific American. New York. Vol. 85.
—— The Ezekiel Airship. P. 228.
—— A new System of Wireless Telegraphy. P. 230.

Das Wetter. Berlin. 18 *Jahrg.*
Brennecke, W. Neue Drachenversuche in Amerika. Pp. 214–215.
—— In Gewitter. Pp. 212–214.
Sieberg, A. Einige Bemerkungen über Haloerscheinungen. Pp. 207–212.
Stade, Hermann. Die Niederschlagsmessungen auf Berggipfeln. Pp. 201–205.
Schnippel, G. Ein Sonnenuntergang in Verbindung mit Luftspiegelung. Pp. 193–200.

Geographical Journal. London. Vol. 18.
Arctowski, Henry. The Antarctic Voyage of the "Belgica" during the years 1897, 1898, and 1899. Pp. 353–395.
Ravenstein, E. G. The Lake-Level of the Victoria Nyanza. Pp. 403–406.

L'Aerophile. Paris. 9me Année.
—— Des Expériences de Santos-Dumont. Pp. 181–212.

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Fraser, W. G. On the Breaking of Waves. Pp. 356–361.
Barus, C. The Transmission of the Emanations of Phosphorus through Air and other Media. Pp. 391–403.

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Liveing, S. D. and Dewar, J. Sur le spectre de la partie la plus volatile des gaz de l'atmosphère qui ne sont pas condensés à la température de l'hydrogène liquide. P. 615.

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G. G. La vitesse de l'air. P. 314.

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Lemee, C. La previsión del tiempo. Pp. 282–288.

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Eschenhagen, M. Werte der erdmagnetische Elemente zu Potsdam für das Jahr 1900, sowie der Säcularvariationen für die Zeit von 1890 bis 1900. Pp. 424–428.
Toepler, M. Einfluss von Diaphragmen auf elektrische Dauerentladung durch Luft von Atmosphärendruck. Pp. 339–347.
Tamm, Franz. Ueber den Einfluss des Luftdruckes und der Luftfeuchtigkeit auf die Entladung statischer Elektricität aus Spitzen. Pp. 259–279.

Ciel et Terre. Bruxelles. 22me année. 1901.
Vandevyver, —. Action de l'électricité sur le brouillard. Pp. 364–371.

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Grossmann, —. Die Extremtemperaturen in Hamburg in den Jahren 1876 bis 1900. Pp. 463–467.
—— Die Witterung zu Tsingtau in den Monaten vom Januar bis Mai 1901. Nach den Aufzeichnungen und einem Bericht der Kaiserlichen meteorologisch-astronomischen Station zu Tsingtau. Pp. 459–463.
Dinklage, L. E. Orkan im östlichen Theile des nordatlantischen Passatgebietes im September 1900. Pp. 457–458.
—— Aus den wissenschaftlichen Ergebnissen der Polarfahrt des "Matador" unter Führung des Kapt.-Leut. a. D. Oskar Bauendahl, Herbst und Winter 1900–1901. Pp. 445–457.

Illustrirte Aëronautische Mittheilungen. Strassburg. Oktober 1901.
—— Der Flugapparat von Gustav Weisskopf. P. 165.
Koeppen, W. Beiträge zur Mechanik des Fluges und schwebenden Falles. Pp. 149–160.
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Steffen, Karl. Das flugdynamische Prinzip. Pp. 160–162.

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Alexander, Patrick Y. Sounding the Air by Flying Machines controlled by Hertzian Waves. P. 59.
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Ravenstein, E. G. Climatology of Africa. Pp. 146–148.
Dickson, H. N. Mean Temperature and the Causes of Glacial Periods. Pp. 145–146.
Shaw, W. N. Sea Temperature and Variation of Air Temperature in British Isles. P. 145.
Shaw, W. N. Weather Maps. Pp. 144–145.
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—— Uber den Einfluss des Luftdruckes auf das Blut. P. 696.
—— Die meteorologischen Veränderungen infolge einer Sonnenfinsterniss. Pp. 694–695.
—— Die untersuchung der Gewitter und Hagelfälle in Bayern. Pp. 662–668.
—— Die bisherigen Forschungsreisen im südlichen Polargebiete. Pp. 657–662.
—— Meteorologie und Seeschiffahrt. Pp. 651–657.
Meteorologische Zeitschrift. Wien. Band 18.
Draenert, F. M. Das Höhenklima von Uberaba, Central-Brasilien. Pp. 385–406.
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THE GENERAL CIRCULATION OF THE ATMOSPHERE, ESPECIALLY IN ARCTIC REGIONS.[1]

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The circulation on an ideal planet.—The problem of the general circulation of the atmosphere "on the earth as it really is" has long engaged the attention of eminent physicists and meteorologists, but on account of its complicated character its complete solution is yet to be given. On page 300 of the present volume of the MONTHLY WEATHER REVIEW, Marcel Brillouin has presented a brief résumé of some of the more important papers bearing on this subject. As this writer shows, there have not been wanting elaborate analyses of the atmospheric motions that would take place on an ideal earth, one, for instance, having a homogeneous frictionless surface, and with the temperature diminishing uniformly with latitude and elevation, but having no temperature variation with longitude. Of this class of investigations he says:

> From this point of view no memoir can compare with that of von Helmholtz. He seems to me to have exhausted the subject that he treats of, "The circulation of a dry gaseous atmosphere upon a polished globe, revolving like the earth." But this is not the last stage; we must find a rigorous treatment of the problem * * * of the atmospheric circulation upon the earth as it really is.

It will certainly assist in the solution of this problem if we ascertain wherein the circulation on an ideal planet differs from the actual circulation on our globe, as shown by observations.

At no point, perhaps, does one theory differ more from another, or theory depart farther from fact, than in regard to the circulation in arctic regions. Thus, Ferrel[2] showed that, assuming the earth to be a rotating frictionless sphere, with no temperature inequalities upon its surface, if the air were at rest it would remain at rest, unless set in motion by some force. If a force act to produce motion along a meridian in the direction of the pole, the rotation of the earth would deflect it toward the east, and the deflecting force would so accelerate the easterly motion as the pole was approached that an infinite velocity would be attained, and the barometric pressure would be reduced to zero. Friction causes the actual pressure to be far greater than zero.

Assuming a diminution of temperature with latitude, but no temperature variation with longitude, a meridional flow toward the pole would be established which would immediately be deflected toward the east, and would be accelerated as the pole was approached. Its velocity would also increase with the altitude, and would attain to infinity before reaching the pole unless retarded by friction.

Oberbeck[3] assumed a homogeneous rotating sphere, with an upper boundary surface for the atmosphere at an undetermined height, except that the ratio between H, the height of the atmosphere, and R, the radius of the earth, is small as compared to unity. Along this upper boundary surface the air glides without friction, but the friction between the surface of the earth and the atmosphere is sufficient to prevent slipping. The temperature on the earth's surface varies with latitude only, and in accordance with a law expressed by a harmonic function of the second order. The temperature variation with altitude is assumed to follow the same law as for the conduction of heat.

Under these assumptions Oberbeck developed formulæ by which he computed the following components of motion of the atmosphere: (1) the vertical and meridional movements due to the difference in temperature between the equator and the poles; (2) the east and west movements due to the rotation of the earth; and (3) the meridional and vertical movements resulting from the rotational flow.

His results show that the atmosphere is ascending between the equator and latitude 35°, and descending between the latter parallel and the poles. The meridional movements are from north to south up to a little more than half the height of the atmosphere, and from south to north above that level. West to east winds generally prevail, increasing in velocity with altitude and reaching a maximum at about latitude 55°. They diminish to zero at the poles, and become minus or from east to west in the lower strata within the Tropics.

Oberbeck's circulation appears to accord more nearly with the observed facts than Ferrel's, since his eastward winds diminish to zero at the poles instead of attaining such excessive velocities as Ferrel's formulæ would seem to require. But Oberbeck's equations give enormous velocities for the wind at a little distance above the surface of the earth, unless we make the ratio $\frac{H}{R}$ very small, or the factor representing the internal resistance of the air very large.

It is thus seen that the theories of both Ferrel and Oberbeck are faulty, in that they suppose no temperature variation with longitude and attribute too great a retarding effect to internal friction. In fact on this latter point von Helmholtz[4] has said:

[1] Abstract of a thesis submitted for the degree of *M. S.*, Columbian University, Washington, D. C., 1900.

[2] Motions of Fluids and Solids relative to the Earth's Surface, 1859, and Recent Advances in Meteorology, 1886.

[3] Translated in The Mechanics of the Earth's Atmosphere. Abbe, Washington, 1891, p. 176.

[4] Translated in The Mechanics of the Earth's Atmosphere. Abbe, Washington, 1891, p. 78.

The influence of fluid friction in the interior of very extended regions that are filled with fluid and contain no vortex motion is always relatively very small.

Without attributing to von Helmholtz's theory the completeness claimed for it by Brillouin in the paragraph already quoted, it must be admitted that his theory of the retardation of Ferrel's and Oberbeck's circulation is a step in advance. Briefly stated, he substitutes for the internal friction of the air the resistances due to vortex motions, which are generated by convectional currents, and also by the mutual interferences between currents of unequal density at their common surfaces of separation.

Temperature variation with longitude introduced.—In 1893, at the Meteorological Congress at Chicago, L. Teisserenc de Bort, in a paper on the "General circulation," while acknowledging the general excellence of the theories of Ferrel and Oberbeck, questioned some of their deductions. With Helmholtz, he did not believe that the great disparity that exists between theoretical and observed easterly velocities could be attributed to friction. Furthermore, quoting his exact language:

As to the general westerly currents traveling toward the pole and returning to the equatorial regions, which Ferrel has placed in the highest strata of the atmosphere, it has not been possible to verify their existence, and I have long had doubts about them.

Teisserenc de Bort's theory of the general circulation takes into account the variation of surface temperature with both latitude and longitude. In consequence, areas of high and low pressure are formed instead of bands, as in Ferrel's and Oberbeck's theories; and these areas are called "the great centers of action of the atmosphere." About these the lower air strata circulate; but since the areas disappear at a comparatively low altitude, the upper circulation consists like Ferrel's of eastward currents.

The secondary circulation included.—In an article entitled "International cloud work,"[5] which summarizes some of the results of the observations made in the United States during the year ending June 30, 1897, Prof. Frank H. Bigelow arrives at much the same conclusions respecting the general circulation as Teisserenc de Bort, as is shown by the following very concise statement:

There are enormous counter currents passing by each other at the same level, and not over one another at different elevations.

This most important deduction, which is the result of a careful analysis of accurate measurements of cloud motions at the different levels, must greatly modify the theories of the general circulation heretofore very generally entertained. The theories of Ferrel and Oberbeck call for a northward component for the eastward movement in the upper strata, and a southward component in the lower strata. Without such components the Ferrel-Oberbeck canal-like circulation obviously can not be maintained.

Furthermore, if we abandon this canal system of atmospheric circulation with its superposed currents of different velocities and directions, and substitute instead counter currents of different temperatures and densities, passing by each other at the same level, we are at once enabled to account for the moderate eastward movements of the atmosphere; for at the surfaces of separation of these currents eddies will be formed out of which will be generated the cyclones and anticyclones of temperate latitudes. The energy of these latter is thus derived at the expense of the energy of the general circulation, which must therefore have much lower velocities than would be the case if the canal circulation was maintained.

This intimate connection between the general and the secondary circulation is very fully discussed by Professor Bigelow in his Report on the International Cloud Observations.[6]

We may briefly summarize the epoch-making steps in the theory of the general circulation of the air, as follows: Ferrel and Oberbeck divided an entire hemisphere into a simple canal system of winds. Teisserenc de Bort demonstrated by his charts of high level isobars that the upper clouds should have the eastward motion required by the canal theory, but "the great centers of action" at the surface should deflect and greatly modify the surface circulation. Bigelow, while not entirely eliminating the canal theory of Ferrel and Oberbeck, greatly reduces the superposed eastward currents by introducing the powerful north and south currents passing by each other at the same levels, especially in the lower strata.

Cloud observations.—Professor Bigelow has pointed out serious gaps in the series of facts needed to construct a sound theory. Indeed, one can not pursue this subject far without noting the paucity of the data relative to the movement of clouds. Prof. Joseph Henry states in the preface to Coffin's great work[7] that one of its objects was to determine—

The mean direction in which the lower currents of the atmosphere move over all parts of the surface of the earth, including in the term "lower currents" all that part of the atmosphere on which direct observations can be made, whether by means of a vane, or by the motions of the clouds.

Dr. Alexander Woeikof, in discussing the data therein collected, stated, with reference to the cloud observations:

Generally it is seen that the clouds move from the same direction as the air near the surface of the earth, which would lead to the conclusion that the lower strata of clouds were those observed.

As to the high clouds, the cirri, as far as known they move generally from the west, except in the polar regions. Considering all this, * * * I shall not consider the subject (cloud movement) in the further deductions.

Dr. Woeikof's deductions were therefore based entirely upon the observations of surface winds, although he recognized a general easterly movement of the cirri.

Hildebrandsson has charted the direction of motion of the cirrus clouds over portions of the tropical and temperate zones, but particularly over Europe; and the International Cloud Work of 1896–97, now being published, is adding to our knowledge of this subject.

The international polar expeditions of 1882–83 were instructed to observe the direction of motion of all clouds, and these observations were published in full in the reports of the expeditions; but, so far as I know, they have never been systematically studied. I have therefore undertaken to tabulate them in such form as will best enable us to judge of the movements of the upper and lower clouds in the polar regions at different seasons of the year.

In preparing Table 1, headed "Number of times clouds and winds were observed from different points of the compass," the number of times the clouds were recorded as *without motion* has been disregarded, for the reason that in many cases an absence of recorded motion simply means that it was impossible to observe the actually existing motion.

The directions of the surface winds at Sodankyla were taken from a table in the report of the international polar expedition to that place, which gives the number of times the winds were observed from the different points of the compass during each month.

The directions of the surface winds at Bossekop were obtained from Coffin's tables, which give the number of times the winds were observed from the different directions for each season; but the directions for the summer have been omitted, since his data for Bossekop includes observations for only two days during this season. The directions of the surface winds for all other stations have been taken from

[5] American Journal of Science, Vol. VIII. Dec. 1899. p. 433.

[6] Report of the Chief of the Weather Bureau, 1998–1899, Vol. II, p. 626.

[7] The Winds of the Globe. Washington, 1875.

Buchan's Table VII, in the Report on the Voyage of H. M. S. *Challenger*, "Showing the average number of days each month the wind has prevailed from the north, northeast, east, etc."

In Table 2 the number of times clouds and winds were observed from the different directions each season has been reduced to percentages when the directions were recorded to sixteen points of the compass, but to fifty observations for each season when the directions were recorded to only eight points.

It will be noticed that where the attempt was made to record cloud directions to sixteen points there were relatively few clouds recorded from the north-northeast, east-northeast, east-southeast, etc., on account of the difficulty of estimating directions by the unaided eye closer than to eight points. The number of times the clouds were observed moving from each of the sixteen points were therefore plotted, and a curve interpolated between these irregularities in the observations. The arrows on Chart No. X, showing the prevailing winds at different levels, have been drawn to conform with these smoothed curves; the relative lengths of the arrows indicate the relative frequency of the various directions at the different stations.

The following table shows the available material. It will be seen that observations are lacking from longitude 160° west to 60° east.

Station.	Lat.	Long.	Number of cloud observations.	Remarks.
	° ′	° ′		
Franz Joseph Land.	81 00	54 00 E.	July, 1898, to July, 1899; from 2 to 3 observations per day.	E. B. Baldwin, United States Weather Bureau, observer.
Nova Zembla.	72 23	52 34 E.	Sept., 1882, to Aug., 1883; hourly.	Upper and lower clouds given the same direction when observed together.
Sodankyla....	67 27	26 36 E.	Sept., 1882, to Aug., 1883; hourly.	
Bossekop	69 57	23 15 E.	Aug., 1882, to Aug., 1883; hourly.	
Jan Mayen....	71 00	8 40 W.	Aug., 1882, to July, 1883; hourly.	
Godthaab.....	64 11	51 43 W.	Aug., 1882, to Aug., 1883; hourly.	Upper and lower clouds given the same direction when observed together.
Kingua Fjord.	66 36	67 19 W.	Sept., 1882, to Aug., 1883; hourly.	
Nain	56 33	61 41 W.	Oct., 1882, to Sept., 1883; 3 observations daily.	
Fort Conger...	81 44	64 45 W.	Aug., 1881, to July,* 1882; 6 observations per day; hourly July, 1882.	No cloud directions recorded from November 4, 1881, to April 5, 1882, inclusive.
Point Barrow.	71 23	156 40 W.	Oct., 1881, to Aug., 1883; hourly.	Upper and lower clouds given the same direction when observed together.
			Aug., 1889, to July, 1893; 2 to 3 observations per day.	Clouds incorrectly classified.
Fort Rae.....	62 39	115 44 W.	Sept., 1882, to Aug., 1883; hourly.	

*The direction of motion of clouds was not recorded during Greely's second year at Fort Conger.

The north polar circulation.—In studying Tables 1 and 2, and Chart X, we first note the extreme variability of the surface winds and the frequency of calms at the two most northerly stations, particularly in winter. It is because of this variability that *prevailing directions* have been preferred rather than the *resultant* direction, since the latter would completely hide the characteristics of the winds in this region.

In general, the prevailing surface movements are from some easterly point, thus:

Stations.	Year.	Winter.	Spring.	Summer.	Autumn.
Franz Joseph Land.....	ne.	ne.	n. and ne.	s.	n. and ne.
Nova Zembla	se.	se. and s.	se.	nw.	se.
Bossekop	se.	se.	se.	.....	se.
Jan Mayen	se.	se.	n.	se.	se.
Godthaab	ne.	ne.	ne.	s.	ne.
Fort Conger	e.	e.	e.	sw.	e.
Point Barrow	e.	w.	e. and ne.	e.	e.
Fort Rae	se.	n. and nw.	se.	se. and e.	variable.

The exceptions are as follows:

Stations.	Year.	Winter.	Spring.	Summer.	Autumn.
Sodankyla	ssw.	ssw.	ssw.	n. and ne.	sse.
Kingua Fjord	s. and sw.	n.	s.	sw.	n.
Nain	w.	w.	w. and ne.	ne. and e.	w.

Chart X, fig. 1, shows an area of low barometric pressure central at about latitude 60° north, and longitude 30° west, throughout the year, although much more marked in winter than in summer. Most of the above stations are grouped about this low, and the surface winds at these stations are largely under its influence. This is particularly the case in the winter at Franz Joseph Land, Nova Zembla, Sodankyla, Jan Mayen, Godthaab, Nain, and Kingua Fjord. The winds are much more variable during the summer than at other seasons of the year.

The lower clouds have a less marked uniformity in the prevailing motion, thus:

Stations.	Year.	Winter.	Spring.	Summer.	Autumn.
Franz Joseph Land	ne.	ne.	n. and ne.	sw.	ne.
Nova Zembla	se.	sw.	n. and se.	n.	se.
Sodankyla.....	sw.	sw.	n.	se.	sw.
Bossekop.....	w. and nw.	w.	nw.	w.	nw.
Jan Mayen	se.	se.	se.	se.	se.
Godthaab	s. and e.	n.	se. and sse.	s.	s.
Kingua Fjord	w.	w.	n.	se. and w.	nw.
Nain	w. and nw.	n.	w.	w.	nw.
Fort Conger.....	sw.	.....	e.	sw.	sw.
Point Barrow	e.	w.	e.	e.	ne.
Fort Rae	nw.	nw.	nnw.	nw.	nw.

It is seen that the direction of movement of the lower clouds corresponds quite closely to that of the surface winds at Franz Joseph Land, Nova Zembla, Sodankyla, Jan Mayen, Nain, and Point Barrow, while the tables for Bossekop, Godthaab, Fort Conger, and Fort Rae, show a very close agreement between the movements of the upper and lower clouds.

The upper clouds generally move from a westerly point, thus:

Stations.	Year.	Winter.	Spring.	Summer	Autumn.
Franz Joseph Land....	ne. and nw.	ne.	n.	nw.	ne.
Sodankyla.....	w.	wnw. and nw.	n.	w.	sw.
Bossekop.....	w.	w.	w.	w.	w.
Jan Mayen	sw.	sw.	sw.	sw. and se.	sw.
Nain	nw.	nw.	w. and nw.	w. and nw.	nw.
Fort Conger	sw.	.....	sw.	w.	e. and s.
Point Barrow	sw.	sw.	sw.	sw.	sw.
Fort Rae	nw.	nw.	nw.	nw.	sw.

The following are the exceptions:

Stations.	Year.	Winter.	Spring.	Summer.	Autumn.
Nova Zembla	se.	se.	se.	e.	se.
Godthaab	s.	n.	s.	s.	s.
Kingua Fjord	s.	w. and wnw.	se.	s. and se.	s.

Of these three, it was noted, under "Remarks," in the table showing the available material, that at Godthaab and Nova Zembla, whenever upper and lower clouds were observed at the same time, a single direction was recorded. This was interpreted as applying to the direction of the clouds in both strata; but, since the direction of the lower clouds is the more easily observed of the two, it seems probable that the direction of the lower clouds only was observed, although recorded as applying to both. The same method of recording cloud motions was followed at Point Barrow in 1881 to 1883, but not in 1889 to 1893. During the earlier period the records show a decided movement from the east at the upper cloud level, while hardly a trace of it appears in the records of the later period. The movements of the upper clouds for Point Barrow have therefore been determined from the observations of 1889 to 1893, and the records of the direction of motion of the upper clouds at Nova Zembla and Godthaab have been

given little weight in the determination of the upper air movements.

In conclusion, the available observations show a rather weak westward movement of the wind at the surface above latitude 65° north, although it is greatly modified by the low barometric areas in the North Atlantic and in Bering Sea. Indeed, a study of the wind directions in connection with the annual normal isobars shown on Chart X, fig. 1, which are copied from Weather Bureau Bulletin A, shows a very decided cyclonic circulation about the North Atlantic low in winter, and a much weaker action of the same nature in summer. This weakening of the cyclonic action, due to the excessive heating of the land surfaces, causes the variable winds of the arctic region in summer.

Point Barrow is the only polar station included in the present investigation that is not more or less under the influence of the North Atlantic low. It is wholly controlled by the low of Bering Sea, and shows a general westward movement of the surface winds. That this is also true of nearly all Alaskan stations is shown by the following table, which summarizes the wind directions observed at Alaskan stations, and is taken from Dall's Pacific Coast Pilot of Alaska, 1879, Appendix 1, p. 22.

Summary of wind directions at Alaskan stations.

Period.	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Total.
Summer (April to September)	7	17	15	12	16	15	9	9	100
Winter (October to March)...	20	20	20	2	5	7	15	11	100
Year.....	27	37	35	14	21	22	24	20	200
Year (percentages).....	13.5	18.5	17.5	7.0	10.5	11.0	12.0	10.0	100

The wind roses in this same work by Dall show that on the Asiatic side of the Bering Sea low pressure area, the surface winds do not maintain this westward direction, but are deflected decidedly to the south, particularly in winter, very much as they are at Fort Rae in North America.

Few observations are available along the northern coast of Siberia, but from these few we infer a westward movement of the wind in this region with a strong northward component in winter. This inference is confirmed by the memorable journey of the *Fram*[8] through the arctic ice fields from longitude 140° east to 10° east, but further observations, particularly of cloud movements, are needed in this section.

The directions of motion of the lower clouds are so conflicting as to lead to the conclusion that clouds of the lower type sometimes form in the upper current. This would indicate a very shallow surface current. The upper clouds generally show a west to east movement, except where it has been noted that the records of the observations are questionable. When we consider the low altitude at which cirrus clouds frequently form in the polar regions, as has been noted by several observers, and the difficulty of distinguishing between their motion and that of the lower clouds, without the use of a nephoscope, it is not surprising that we find traces in our records of a secondary movement among the upper clouds in the same direction as the surface winds.

In the MONTHLY WEATHER REVIEW for November, 1896, Vol. XXIV, p. 419, and Chart VII, the Editor has shown that in the north polar regions, at 5,000 meters altitude the isobar in December form ovals about the pole, the major axes of which extend over the continents of North America and Asia. These ovals he considers a result of the general circulation at that level, the air currents generally flowing nearly parallel to the isobars. His conclusions are confirmed by these cloud observations, the strong northwesterly movement at Fort Rae, and the southerly and southwesterly movements over Greenland, being in general parallel to opposite sides of the isobaric ovals above referred to, and which are also shown in Professor Bigelow's Report on the International Cloud Observations, Chart 40. His chart 43 shows that this oval is not so marked in summer as in winter.

The westward winds in the lower strata of the atmosphere near the poles are no doubt partly due to the increased barometric pressure at the surface in those latitudes, due to the intense cold. But Ferrel was very nearly correct in ascribing them to the great permanent cyclones that are to be found in the north Atlantic and Pacific oceans, particularly in winter, and it only remained for him to include these permanent cyclones in his mathematical theory of the general circulation. A southwestward movement of the wind should prevail from the north polar high pressure area to the low pressure belt at latitude 60°, but the breaking up of this belt into low pressure areas modifies this circulation, and no doubt greatly retards it in the manner pointed out by von Helmholtz.

If we suppose a system of continuous motions, such as are called for by the theories of Ferrel and Oberbeck, the equation of continuity requires that any retardation of the motions of this system at one point must necessarily retard the motions at all points. It therefore appears that in the circulation about the "centers of action" pointed out by Teisserenc de Bort, and extended by Bigelow to include the *secondary circulation*, we are to seek for the retardation of the enormous velocities called for by the equations of Ferrel and Oberbeck.

It is to be hoped that the present activity in polar explorations will add much to our knowledge of the circulation of the air in polar regions, and that critical studies of cloud directions all over the world will ultimately reveal the true relation between what is now known as the *general* and the *secondary circulation* of the air.

[8] Nansen, Farther North. New York, 1897. Vol. I.

TABLE 1.—*Number of times clouds and winds were observed coming from different points of the compass.*

UPPER CLOUDS.

Location.	Season.	N.	NNE.	NE.	ENE.	E.	ESE.	SE.	SSE.	S.	SSW.	SW.	WSW.	W.	WNW.	NW.	NNW.	Calm.
Franz Joseph Land .. Lat. 81° N. Long. 54° E.	Winter	6		13						2		2		2		5		4
	Spring	24		9		12		1						5		11		8
	Summer	6		1		4						2		3		12		7
	Autumn	2		13		2		7		2				1		8		13
	Year	38		36		18		8		4		4		11		36		32

LOWER CLOUDS.

	Winter	23		51		1		4		4		20		3		18		7
	Spring	50		48		9		7				2		14		12		1
	Summer	34		28		11		15		11		49		11		37		2
	Autumn	20		30		9		20		20		22		8		17		17
	Year	126		157		30		46		35		93		36		84		27

SURFACE WINDS.

	Winter	36		90		3		1		4		30		2		43		4
	Spring	71		64		10		6		1		5		18		42		9
	Summer	44		38		26		21		14		71		21		55		5
	Autumn	40		44		6		28		21		25		6		16		4
	Year	191		236		45		56		40		131		47		156		22

UPPER CLOUDS.

Nova Zembla Lat. 73° 23′ 30″ N. Long. 52° 34′ E.	Winter	5		1		2	2	10	3	3	1	3						
	Spring	8	1	3	1	14	7	29	4	10	8	21	5	8		8	2	
	Summer	13		10	6	28	15	20	2	7	5	6		4		12	2	
	Autumn	20	1	18	1	20	7	37	4	13	5	2	1	3		26	3	
	Year	46	2	32	8	64	31	116	13	33	19	32	6	15		46	7	

LOWER CLOUDS.

	Winter	153	6	110	6	69	129	251	31	167	77	304	7	39	6	82	5	
	Spring	228	9	39	6	193	145	234	51	179	30	215	13	72	11	162	43	
	Summer	288	6	140	21	245	90	80	21	102	45	135	5	142	18	237	44	
	Autumn	143	26	104	24	217	67	318	45	193	26	131	6	48	10	185	42	
	Year	807	47	393	57	724	431	883	148	641	178	785	31	301	45	666	134	

SURFACE WINDS.

	Winter	6		6		13		19		18		9		1		4		
	Spring	9		4		18		24		14		5				7		
	Summer	10		4		14		8		5		9		5		21		
	Autumn	10		6		14		23		12		7		2		8		
	Year	35		20		59		74		49		30		8		40		

UPPER CLOUDS.

Sodankyla Lat. 67° 27′ 29″ N. Long. 26° 35′ 57″ E.	Winter	1						1		2	1	2	2	3	4	4	1	
	Spring	24	2	7	2	8	1	8	11	18	9	13	13	8	8	6	2	
	Summer	22	12	14	6	17	7	18	6	19	12	20	9	42	26	23	12	
	Autumn	6	1	4		1		6	4	13	4	18	2	16	3	13	3	
	Year	53	15	25	8	26	8	33	21	52	26	53	26	69	41	46	18	

LOWER CLOUDS.

	Winter	17		2				4	4	33	34	47	9	20	6	17	4	
	Spring	115	40	91	22	26	11	25	44	78	74	78	43	80	19	49	20	
	Summer	194	132	192	40	103	76	227	105	120	55	100	53	90	38	52	48	
	Autumn	63	15	20	4	21	9	78	44	94	37	108	9	80	9	59	12	
	Year	389	187	305	66	150	96	334	197	325	200	333	114	270	72	177	84	

SURFACE WINDS.

	Winter	95	25	21	11	6	21	129	295	242	419	233	50	46	40	98	92	
	Spring	207	124	143	74	42	63	173	183	178	270	130	69	65	60	115	138	
	Summer	269	290	222	140	110	199	265	176	108	127	79	57	49	32	94	130	
	Autumn	129	44	43	35	36	54	254	280	258	195	209	39	73	59	121	74	
	Year	700	483	429	260	194	337	821	934	781	1,011	651	215	233	191	428	434	

UPPER CLOUDS.

Bossekop Lat 69° 57′ 29″ N. Long. 23° 14′ 46″ E.	Winter		1						3	2	2	5	2	6		1		
	Spring	1		1		2	1	2	5	3	7	10	12	28	6	4		
	Summer	8	2	2	2	9	2	11	8	10	5	22	13	59	15	12	2	
	Autumn					1	3		4	8	6	16	5	20	2	11	1	
	Year	9	3	3	2	12	6	13	20	23	20	53	32	113	23	28	3	

TABLE 1.—*Number of times clouds and winds were observed coming from different points of the compass*—Continued.

LOWER CLOUDS.

Location.	Season.	N.	NNE.	NE.	ENE.	E.	ESE.	SE.	SSE.	S.	SSW.	SW.	WSW.	W.	WNW.	NW.	NNW.	Calm.
Bossekop	Winter	12	5	3	3	1		2		6	9	29	13	40	32	30	4	
Lat. 69° 57′ 29″ N.	Spring	51	15	25	4	13		18	6	37	39	50	26	42	31	63	21	
Long. 23° 14′ 46″ E.	Summer	44	3	13	19	31	29	67	102	141	55	110	76	155	80	125	46	
	Autumn	13	5	2		4	2	5	22	31	59	66	23	62	19	85	22	
	Year	120	28	43	26	49	31	92	130	215	162	255	138	299	162	303	93	

SURFACE WINDS.

	Winter	5	4	25	20	81	515	190	87	49	39	39	29	31	15	23	15	
	Spring	13		3	5	24	251	179	43	39	23	33	15	28	30	59	8	
	Summer*	2		6						1		3					3	
	Autumn	20	7	15	23	106	139	120	78	36	32	29	18	20	13	81	76	
	Year	40	11	49	48	211	905	489	208	125	94	104	62	79	58	163	102	

UPPER CLOUDS.

Jan Mayen	Winter	9	1	5	4	5	1	13	6	8	4	19	3	13	2	12	3	
Lat. 71° 0′ N.	Spring	23	2	5	3	3	3	13	4	9	14	32	5	12	2	4	20	
Long. 8° 40′ W.	Summer	8	8	7	1	1	6	33	5	8	4	34	2	13	1	12	4	
	Autumn	22		10	2	14		16	2	12	1	20	5	25	6	19	3	
	Year	62	11	27	10	23	10	75	17	37	23	105	15	63	11	47	30	

LOWER CLOUDS.

	Winter	86	9	30	16	45	76	134	23	48	23	34	8	28	11	51	40	
	Spring	123	86	57	21	43	63	136	30	63	29	57	26	60	16	66	82	
	Summer	176	73	48	8	46	116	250	59	59	34	51	5	17	15	81	57	
	Autumn	129	12	45	34	226	96	195	42	70	45	59	4	50	18	112	35	
	Year	514	180	180	79	360	351	715	154	240	131	201	43	155	60	310	214	

SURFACE WINDS.

	Winter	19		5		20		24		4		1		3		10		
	Spring	21		11		11		17		5		2		5		17		
	Summer	18		6		6		30		6		2		2		14		
	Autumn	14		3		23		28		5		1		3		12		
	Year	72		25		60		99		20		6		13		53		

UPPER CLOUDS.

Godthaab	Winter	29	1	12	2	7		12	8	11	4	2				19	3	
Lat. 64° 11′ N.	Spring	7	1	5		8		18	22	33		28	1	3		13	6	
Long. 51° 43′ 30″ W.	Summer	36	6	13		4	1	36	50	53	4	23	5	12	1	27	1	
	Autumn	38	2	23		2		19	8	41	8	23	1	8		10	6	
	Year	110	10	53	2	21	1	85	88	138	16	76	7	23	1	69	16	

LOWER CLOUDS.

	Winter	100	1	35	3	9		41	41	34		28		20		87	23	
	Spring	40	4	12		2		95	96	55	4	30	1	3	4	58	17	
	Summer	50	9	18		7		28	158	169	19	51	4	13	1	17	2	
	Autumn	71	15	35		1	3	49	52	85	14	10	4	16	1	26	19	
	Year	261	29	100	3	19	3	213	347	343	37	119	9	52	6	188	61	

SURFACE WINDS.

	Winter	15		25		12		3		10		4		3		9		
	Spring	16		21		8		2		15		7		3		7		
	Summer	9		14		3		1		23		13		5		8		
	Autumn	8		24		13		2		20		5		2		3		
	Year	48		84		36		8		68		29		13		27		

UPPER CLOUDS.

Kingua Fjord	Winter									1			1	1	1	1		
Lat. 66° 35′ 40″ N.	Spring	3		1		3	1	8	2	3		2			1	4	2	
Long. 67° 19′ 15″ W.	Summer	3	1	1				1	4	4	1	4	1	4		1	4	
	Autumn	1		1	1	3		4		6		2		3	4	4		
	Year	7	1	3	1	6	1	13	6	14	1	8	2	8	6	10	6	

LOWER CLOUDS.

	Winter	3	1		1		1				3	2		7				
	Spring	18		4	1	13	6	16	5	13	7	8	1	4	2	7	2	
	Summer	22	5	4	2	14	10	23	11	17	4	15	5	23	3	14	9	
	Autumn	4	2	2	2	9	3	12	7	6	2		3	10	8	19	3	
	Year	47	8	10	6	36	20	51	23	36	16	25	9	44	13	40	14	

* For two days only.

TABLE 1.—*Number of times clouds and winds were observed coming from different points of the compass*—Continued.

SURFACE WINDS.

Location.	Season.	N.	NNE.	NE.	ENE.	E.	ESE.	SE.	SSE.	S.	SSW.	SW.	WSW.	W.	WNW.	NW.	NNW.	Calm.
Kingua Fjord. Lat. 66° 35′ 40″ N. Long. 67° 19′ 15″ W.	Winter	10		6				2		6		7		3		7		
	Spring	9		9		3		8		17		12		1		2		
	Summer	3		5				8		29		33		4				
	Autumn	17		16		4		6		12		10		3		5		
	Year	39		36		7		24		64		62		11		14		

UPPER CLOUDS.

Nain Lat. 56° 33′ N. Long. 61° 41′ W.	Winter	7	3	4		3	2	5		5	2	6	4	14	6	19	2	
	Spring	4	3		1	2	1	7	5	2	5	10	5	15	7	14	1	
	Summer	8	1				1	1	2	5	4	22	4	24	13	25	5	
	Autumn	12		1	1	1				1	2	12	5	14	11	28	8	
	Year	31	7	5	2	6	4	13	7	13	13	50	18	67	37	86	16	

LOWER CLOUDS.

	Winter	12	4	6	1	2	1	1		5	1	1	1	7	4	6		
	Spring		2	5		1	1	1	1		4	10	1	15	4	11		
	Summer	14	4	10	2	13		3	1	4	6	12	2	28	13	23	5	
	Autumn	17	5	7	6	1		4	3	4	1	4	5	18	29	39	10	
	Year	43	15	28	9	17	2	9	5	13	12	27	9	68	50	79	15	

SURFACE WINDS.

	Winter	6		3		2		1		2		7		40		17		
	Spring	10		18		8		4		3		9		20		12		
	Summer	7		17		17		4		3		10		15		12		
	Autumn	11		6		6		2		4		8		30		19		
	Year	34		44		33		11		12		34		105		60		

UPPER CLOUDS.

Fort Conger. Lat 81° 44′ N. Long. 64° 45′ W.	Winter																	68
	Spring	2		4		2		2		6		10		3		5		76
	Summer	3				2				5		8		15		8		85
	Autumn					2				2		1		1		1		61
	Year	5		4		6		2		13		19		19		14		290

LOWER CLOUDS.

	Winter																	212
	Spring			3		5		2		2		2		1		3		325
	Summer	7		7		31		13		38		54		18		30		682
	Autumn			5		4		2		4		6				1		212
	Year	7		15		40		17		44		62		19		24		1431

SURFACE WINDS.

	Winter	1		5		7		1		2						1		73
	Spring	7		14		20		12		7		3		3		4		32
	Summer	3		3		6		18		15		29		11		5		2
	Autumn	8		14		17		7		2		4		1		1		37
	Year	19		36		50		38		26		36		15		11		134

UPPER CLOUDS.

Point Barrow (Uglaamie). Lat. 71° 23′ N. Long. 156° 40′ W.	Winter			2		4		9		1	2	14		10		9	2	
	Spring	4	1	24	13	39	3	10	2	6	3	29		22		7		
	Summer	13	1	64	27	76	16	28	10	11	8	90	8	51	4	11	2	
	Autumn	3		20	5	14		8		3		8		6	1	4	7	
	Year	20	2	110	45	133	19	55	12	21	13	141	8	89	5	31	11	

LOWER CLOUDS.

	Winter	11		6		14		25	1	9	4	43	2	79	3	31	2	
	Spring	14	9	74	34	112	16	39	4	21	18	114		75	6	28	11	
	Summer	95	44	251	137	392	85	92	27	93	34	339	36	173	19	74	22	
	Autumn	43	10	163	30	145	5	32	6	20	9	35	14	75	12	60	12	
	Year	163	63	494	201	663	106	188	38	143	65	531	52	402	40	193	47	

SURFACE WINDS.

	Winter	10		12		14		8		7		12		16		7		
	Spring	7		14		15		13		9		12		15		6		
	Summer	13		20		24		10		4		9		7		5		
	Autumn	6		25		27		9		8		5		3		8		
	Year	36		71		80		40		28		38		41		26		

TABLE 1.—*Number of times clouds and winds were observed coming from different points of the compass*—Continued.

UPPER CLOUDS.

Location.	Season.	N.	NNE.	NE.	ENE.	E.	ESE.	SE.	SSE.	S	SSW.	SW.	WSW.	W.	WNW.	NW.	NNW.	Calm.
Point Barrow (Aug., 1889–July, 1893). Lat. 71° 23′ N. Long. 156° 40′ W.	Winter	6		11		1		8		5		28		6		15		
	Spring	1		14		7		42		28		57		9		13		
	Summer	2		8		3		20		35		70		16		4		
	Autumn			3		2		21		16		33		8		4		
	Year	9		36		13		91		84		188		39		36		

LOWER CLOUDS.

	Winter	30		67		31		16		34		77		37		23		
	Spring	16		79		125		39		29		67		40		21		
	Summer	31		114		160		50		33		117		71		54		
	Autumn	39		214		110		66		31		54		58		48		
	Year	116		474		426		171		127		315		206		146		

UPPER CLOUDS.

Fort Rae. Lat. 62° 38′ 52″ N. Long. 115° 43′ 50″ W.	Winter	41		11	4	4	3	21	5	1		14	1		1	91	4	
	Spring	19		9		5	11	9	1	2	1	7	3	12	14	106	19	
	Summer	10			2	1	3	6	6	18	10	75	33	32	53	145	10	
	Autumn	26	1	8	4	11	6	40	6	36	1	97	1	36	2	51	10	
	Year	96	1	28	10	21	23	76	18	57	12	193	38	80	70	393	43	

LOWER CLOUDS.

	Winter					1										4		
	Spring						2	1				2	1		8	15	2	
	Summer	10	1	18	4	6	2	7	4	8	10	58	19	28	52	151		
	Autumn															12		
	Year	10	1	18	4	7	4	8	4	8	16	60	20	28	60	182	2	

SURFACE WINDS.

	Winter	20		2		9		9		2		1		4		21		
	Spring	15		1		21		28		4				2		14		
	Summer	14		7		20		19		8		3		5		13		
	Autumn	16		8		15		16		7		4		4		15		
	Year	65		18		65		72		21		8		15		63		

TABLE 2.—*Relative frequency of clouds and winds coming from different points of the compass.*

UPPER CLOUDS.

Franz Joseph Land. Lat. 81° N. Long. 54° E.	Winter	10		22						3		4		3		8		
	Spring	19		7		10		1						4		9		
	Summer	11		2		7						4		5		22		
	Autumn	3		19		3		10		3				1		11		
	Year	43		50		20		11		6		8		13		50		

LOWER CLOUDS.

	Winter	9		21				2		2		8		1		7		
	Spring	18		17		3		2				1		5		4		
	Summer	9		7		3		4		3		12		3		9		
	Autumn	7		10		3		7		7		7		3		6		
	Year	43		55		9		15		12		28		12		26		

SURFACE WINDS.

	Winter	9		21		1				1		7		1		10		
	Spring	16		15		2		1				1		4		10		
	Summer	8		7		4		4		2		12		3		10		
	Autumn	11		12		2		8		6		7		2		4		
	Year	44		55		9		13		9		27		10		34		

UPPER CLOUDS.

Nova Zembla. Lat. 72° 22′ 36″ N. Long. 52° 34′ E.	Winter	17		3		7	7	33	10	10	3	10						
	Spring	6	1	2	1	11	5	22	3	8	6	16	4	6		6	2	
	Summer	10		8	5	22	12	15	2	5	4	5		3		9	1	
	Autumn	11	1	10	1	11	4	31	2	7	3	1	1	2		14	2	
	Year	44	2	23	7	51	28	101	17	30	16	32	5	11		29	5	

LOWER CLOUDS.

	Winter	11		8		5	9	17	2	12	5	21		3		6		
	Spring	14	1	2		12	9	14	3	11	2	13	1	4	1	10	3	
	Summer	13		9	1	15	6	5	1	6	3	8		9	1	15	3	
	Autumn	9	2	7	1	14	4	20	3	12	2	8		3	1	12	3	
	Year	52	3	26	2	46	28	56	9	41	12	50	1	19	3	43	9	

TABLE 2.—*Relative frequency of clouds and winds coming from different points of the compass*—Continued.

SURFACE WINDS.

Location.	Season.	N.	NNE.	NE.	ENE.	E.	ESE.	SE.	SSE.	S.	SSW.	SW.	WSW.	W.	WNW.	NW.	NNW.	Calm.
Nova Zembla.	Winter	4		4		9		12		12		6		1		3		
Lat. 73° 27′ 36″ N.	Spring	6		2		11		15		9		3				4		
Long. 52° 34′ E.	Summer	7		3		9		5		3		6		3		14		
	Autumn	6		4		9		14		7		4		1		5		
	Year	23		13		38		46		31		19		5		26		
UPPER CLOUDS.																		
Sodankyla	Winter	5						5		10	5	9	10	14	13	13	5	
Lat. 67° 27′ 29″ N.	Spring	17	1	5	1	6	1	6	8	13	7	9	9	6	6	4	1	
Long. 26° 35′ 57″ E.	Summer	8	5	5	2	6	3	7	2	7	5	8	3	16	10	9	5	
	Autumn	7	1	4		1		7	4	14	4	19	2	17	3	14	3	
	Year	37	7	14	3	13	4	25	14	44	21	45	24	53	38	46	14	
LOWER CLOUDS.																		
	Winter	9		1				2	2	17	17	24	5	10	3	9	2	
	Spring	14	5	11	3	3	1	3	5	10	9	10	5	10	2	6	3	
	Summer	12	8	12	3	6	5	14	7	7	3	6	3	6	2	3	3	
	Autumn	10	2	3	1	3	1	12	7	14	6	16	1	12	1	9	2	
	Year	45	15	27	7	12	7	31	21	48	35	56	14	38	8	27	10	
SURFACE WINDS.																		
	Winter	5	1	1	1		1	7	16	13	23	13	3	3	2	5	5	
	Spring	10	6	7	4	2	3	9	9	9	13	6	3	3	3	6	7	
	Summer	12	12	10	6	5	9	11	8	4	5	3	2	2	1	4	6	
	Autumn	7	2	2	2	2	3	13	15	14	10	11	2	4	3	6	4	
	Year	34	21	20	13	9	16	40	48	40	51	33	10	12	9	21	22	
UPPER CLOUDS.																		
Bossekop	Winter		5						14			23	9	27		5		
Lat. 69° 57′ 29″ N.	Spring	1		1		2	1	3	6	4		12	15	34	7	5		
Long. 23° 14′ 46″ E.	Summer	4	1	1	1	5	1	6	4	6	3	12	7	32	8	7	1	
	Autumn					1	4		5	10	8	21	7	26	3	14	1	
	Year	5	6	2	1	8	6	9	29	20	29	68	38	119	18	31	2	
LOWER CLOUDS.																		
	Winter	6	3	2	2	1		1		3	5	15	7	21	17	16	2	
	Spring	12	3	6	1	3		4	1	8	9	11	6	10	7	14	5	
	Summer	4		1	2	3	3	6	9	13	5	10	7	14	7	11	4	
	Autumn	3	1			1		1	5	7	14	16	6	15	5	20	5	
	Year	25	7	9	5	8	3	12	15	31	33	52	26	60	36	61	16	
SURFACE WINDS.																		
	Winter			2	2	7	44	16	7	4	4	3	3	3	1	2	1	
	Spring	2			1	3	33	24	6	5	3	4	2	4	4	8	1	
	Summer																	
	Autumn	2	1	2	3	13	17	15	10	4	4	4	2	2	2	10	9	
	Year*	4	1	4	6	23	94	55	23	13	11	11	7	9	7	20	11	
UPPER CLOUDS.																		
Jan Mayen	Winter	8	1	3	4	5	1	12	5	7	4	16	3	12	2	11	3	
Lat. 71° 0′ N.	Spring	15	1	3	2	2	2	8	3	6	9	21	3	8	1	3	13	
Long. 8° 40′ W.	Summer	5	6	5	1	1	4	22	3	5	3	23	1	9	1	8	3	
	Autumn	14		6	1	9		10	1	8	1	13	3	16	4	12	2	
	Year	42	8	19	8	17	7	52	12	26	17	75	10	45	8	34	21	
LOWER CLOUDS.																		
	Winter	13	1	5	2	7	12	20	3	7	3	5	1	4	2	8	6	
	Spring	13	9	6	2	4	7	14	3	7	3	6	3	6	2	7	9	
	Summer	16	7	4	1	4	11	23	5	5	3	5	1	2	1	7	5	
	Autumn	11	1	4	3	19	8	17	4	6	4	5		4	2	10	3	
	Year	53	18	19	8	34	38	74	15	25	13	21	5	16	7	32	23	
SURFACE WINDS.																		
	Winter	11		3		12		14		2		1		2		6		
	Spring	12		6		6		10		3		1		3		10		
	Summer	11		4		4		13		4		1		1		8		
	Autumn	8		2		13		16		8				2		7		
	Year	42		15		35		53		12		3		8		31		

*No data during the summer months.

TABLE 2.—*Relative frequency of clouds and winds coming from different points of the compass*—Continued.

UPPER CLOUDS.

Location.	Season.	N.	NNE.	NE.	ENE.	E.	ESE.	SE.	SSE.	S.	SSW.	SW.	WSW.	W.	WNW.	NW.	NNW.	Calm.
Godthaab	Winter	27	1	11	2	6	.....	11	7	10	4	2	.....	.....	.....	17	3	.....
Lat. 64° 11′ 30″ N.	Spring	5	1	3	.....	6	.....	12	15	23	.....	19	1	2	.....	9	4	.....
Long. 51° 43′ W.	Summer	13	2	5	.....	2	.....	13	18	20	2	8	2	4	.....	10	.....	.....
	Autumn	20	1	12	.....	1	.....	10	4	22	4	12	1	4	.....	5	3	.....
	Year	65	5	31	2	15	.....	46	44	75	10	41	4	10	.....	41	10	.....
	LOWER CLOUDS.																	
	Winter	24	.....	8	1	2	.....	10	10	8	.....	7	.....	5	.....	21	5	.....
	Spring	10	1	3	.....	.....	.....	23	23	13	1	7	.....	1	1	14	4	.....
	Summer	9	2	3	.....	1	.....	5	29	31	4	9	1	2	.....	3	.....	.....
	Autumn	18	4	9	.....	.....	1	12	18	21	4	2	1	4	.....	6	5	.....
	Year	61	7	23	1	3	1	50	75	73	9	25	2	12	1	44	14	.....
	SURFACE WINDS.																	
	Winter	9	.....	15	.....	7	.....	2	.....	6	.....	3	.....	2	.....	6	.....	.....
	Spring	10	.....	13	.....	5	.....	1	.....	10	.....	4	.....	2	.....	4	.....	.....
	Summer	6	.....	9	.....	2	.....	1	.....	15	.....	9	.....	3	.....	5	.....	.....
	Autumn	5	.....	16	.....	9	.....	1	.....	13	.....	3	.....	1	.....	2	.....	.....
	Year	30	.....	53	.....	23	.....	5	.....	44	.....	19	.....	8	.....	17	.....	.....
	UPPER CLOUDS.																	
Kingua Fjord	Winter	.....	.....	.....	.....	.....	.....	.....	.....	20	.....	.....	20	20	20	20	.....	.....
Lat. 66° 35′ 40″ N.	Spring	10	.....	3	.....	10	3	27	7	10	.....	7	.....	.....	3	13	7	.....
Long. 67° 19′ 15″ W.	Summer	10	4	3	.....	.....	.....	3	14	14	4	14	3	14	.....	3	14	.....
	Autumn	3	.....	3	4	10	.....	14	.....	21	.....	7	.....	10	14	14	.....	.....
	Year	23	4	9	4	20	3	44	21	65	4	28	23	44	37	50	21	.....
	LOWER CLOUDS.																	
	Winter	17	6	.....	5	.....	6	.....	.....	.....	17	11	.....	39	.....	.....	.....	.....
	Spring	17	.....	4	1	12	6	15	5	12	6	7	1	4	2	6	2	.....
	Summer	12	3	2	1	8	6	13	6	9	2	8	3	13	2	8	5	.....
	Autumn	4	2	2	2	10	3	13	8	7	2	.....	3	11	9	21	3	.....
	Year	50	11	8	9	30	21	41	19	28	27	26	7	67	13	35	10	.....
	SURFACE WINDS.																	
	Winter	12	.....	7	.....	.....	.....	2	.....	7	.....	9	.....	4	.....	9	.....	.....
	Spring	7	.....	7	.....	2	.....	7	.....	14	.....	10	.....	1	.....	2	.....	.....
	Summer	2	.....	3	.....	.....	.....	5	.....	18	.....	20	.....	2	.....	.....	.....	.....
	Autumn	12	.....	11	.....	3	.....	4	.....	8	.....	7	.....	2	.....	3	.....	.....
	Year	33	.....	28	.....	5	.....	18	.....	47	.....	46	.....	9	.....	14	.....	.....
	UPPER CLOUDS.																	
Nain	Winter	9	4	5	.....	4	2	6	.....	6	2	7	5	17	7	23	2	.....
Lat. 56° 33′ N.	Spring	5	4	.....	1	2	1	9	6	2	6	12	6	18	9	17	1	.....
Long. 61° 41′ W.	Summer	7	1	.....	.....	.....	1	1	2	4	3	19	3	21	11	22	4	.....
	Autumn	13	.....	1	1	1	.....	.....	.....	1	2	13	5	15	11	29	8	.....
	Year	34	9	6	2	7	4	16	8	13	13	51	19	71	38	91	15	.....
	LOWER CLOUDS.																	
	Winter	23	8	12	2	4	2	2	.....	10	2	2	2	13	8	12	.....	.....
	Spring	.....	4	9	.....	2	2	2	2	.....	7	18	2	27	7	20	.....	.....
	Summer	10	3	7	1	9	.....	2	1	3	4	9	1	20	9	17	4	.....
	Autumn	11	3	5	4	1	.....	3	2	3	1	3	3	12	19	25	7	.....
	Year	44	18	33	7	16	4	9	5	16	14	32	8	72	43	74	11	.....
	SURFACE WINDS.																	
	Winter	4	.....	2	.....	1	.....	1	.....	1	.....	4	.....	26	.....	11	.....	.....
	Spring	6	.....	11	.....	5	.....	2	.....	2	.....	5	.....	12	.....	7	.....	.....
	Summer	4	.....	10	.....	10	.....	2	.....	2	.....	6	.....	9	.....	7	.....	.....
	Autumn	6	.....	4	.....	4	.....	1	.....	2	.....	5	.....	17	.....	11	.....	.....
	Year	20	.....	27	.....	20	.....	6	.....	7	.....	20	.....	64	.....	36	.....	.....
	UPPER CLOUDS.																	
Fort Conger	Winter	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lat. 81° 44′ N.	Spring	3	.....	6	.....	3	.....	3	.....	9	.....	15	.....	4	.....	7	.....	.....
Long. 64° 45′ W.	Summer	4	.....	.....	.....	2	.....	.....	.....	6	.....	10	.....	13	.....	10	.....	.....
	Autumn	.....	.....	.....	.....	14	.....	.....	.....	14	.....	7	.....	7	.....	7	.....	.....
	Year	7	.....	6	.....	19	.....	3	.....	29	.....	32	.....	29	.....	24	.....	.....

TABLE 2.—*Relative frequency of clouds and winds coming from different points of the compass*—Continued.

LOWER CLOUDS.

Location.	Season.	N.	NNE.	NE.	ENE.	E.	ESE.	SE.	SSE.	S.	SSW.	SW.	WSW.	W.	WNW.	NW.	NNW.	Calm.
Fort Conger. Lat. 81° 44′ N. Long. 64° 55′ W.	Winter																	
	Spring			8		14		6		5		6		3		8		
	Summer	2		2		8		4		10		14		5		5		
	Autumn			11		9		5		9		14				2		
	Year	2		21		31		15		24		34		8		15		

SURFACE WINDS.

	Winter	3		15		21		3		6						3		
	Spring	5		10		14		9		5		2		2		3		
	Summer	2		2		3		10		8		16		6		3		
	Autumn	7		13		16		6		2		4		1		1		
	Year	17		40		54		28		21		22		9		10		

UPPER CLOUDS.

Point Barrow (Uglanmie.) Lat. 71° 23′ N. Long. 156° 40′ W.	Winter			4		8		17		2	4	26		19		17	4	
	Spring	2	1	15	8	24	2	6	1	4	2	18		14		4		
	Summer	3		15	7	18	4	7	2	3	2	21	2	12	1	3		
	Autumn	4		25	6	18		10		4		10		8	1	5	9	
	Year	9	1	59	21	68	6	40	3	13	8	75	2	53	2	29	13	

LOWER CLOUDS.

	Winter	5		3		6		11		4	2	19	1	34	1	13	1	
	Spring	2	2	13	6	13	3	7	1	4	3	20		13	1	5	2	
	Summer	5	2	13	7	21	4	5	1	5	2	18	2	9	1	4	1	
	Autumn	6	2	24	4	22	1	5	1	3	1	5	2	11	2	9	2	
	Year	18	6	53	17	62	8	28	3	16	8	62	5	67	5	31	6	

SURFACE WINDS.[a]

	Winter	6		7		8		5		4		7		3		4		
	Spring	4		9		8		7		5		7		8		3		
	Summer	7		11		13		5		2		5		4		3		
	Autumn	3		14		15		5		4		3		2		4		
	Year	20		40		44		22		15		22		23		14		

UPPER CLOUDS.

Point Barrow (Aug. 1889 to July 1893). Lat. 71° 23′ N. Long. 156° 40′ W.	Winter	4		7		1		5		3		17		4		9		
	Spring			4		2		12		8		17		3		4		
	Summer	1		3		1		6		11		22		5		1		
	Autumn			2		1		12		9		19		5		2		
	Year	5		16		5		35		31		75		17		16		

LOWER CLOUDS.

	Winter	5		11		5		3		5		12		6		4		
	Spring	2		9		15		5		3		8		5		3		
	Summer	2		9		13		4		3		9		6		4		
	Autumn	3		17		9		5		3		4		5		4		
	Year	12		46		42		17		14		33		22		15		

UPPER CLOUDS.

Fort Rae. Lat. 62° 38′ 52″ N. Long. 115° 43′ 50″ W.	Winter	20		5	2	2	2	10	2	1		7	1		1	45	2	
	Spring	9		4		2	5	4		1		3	1	6	6	49	9	
	Summer	2			1		1	2	2	4	2	19	8	8	13	36	2	
	Autumn	8		2	1	3	2	12	2	11		29		11	1	15	3	
	Year	39		11	4	7	10	28	6	17	2	58	10	25	21	145	16	

LOWER CLOUDS.

	Winter					20										80		
	Spring						7	3				6	3		26	7	42	
	Summer	3		5	1	2	1	2	1	2	4	15	5	7	14	39		
	Autumn															100		
	Year	3		5	1	22	8	5	1	2	4	21	8	7	40	226	48	

SURFACE WINDS.

	Winter	15		1		7		7		1		1		3		15		
	Spring	9		1		12		17		2				1		8		
	Summer	8		4		11		11		4		2		3		7		
	Autumn	9		5		9		9		4		2		2		9		
	Year	41		11		39		44		11		5		9		39		

NOTES BY THE EDITOR.

WIND FORCE IN TORNADOES.

A correspondent asks: "Has any competent observer ever been able to make any estimate which you think would be at all near the truth of what the speed of the wind is in the funnel of a violent tornado?"

The following reply by the Chief of Bureau will be of general interest:

Prof. F. H. Bigelow has published on page 633 International Cloud Report, Vol. II, Report Chief of Bureau 1898–99, the results of his computation on the great waterspout seen off Cottage City, Mass., August 19, 1896. He gives the following additional facts: This large tornado tube or water spout over the ocean was seen from several localities, and the direction noted so that it was easy to place its position on the map with much exactness. At the same time a series of large pictures were photographed by Mr. Chamberlain, of Cottage City, showing the spout in several positions relative to the landscape in the foreground. Professor Bigelow visited the place and made a suitable survey of the distances so that the scale of the photograph was found, and from this the dimensions of the tube and the height of the cloud. By means of the proper formula the following dimensions in feet, and velocity in miles per hour for the different components were obtained:

Height above sea level.	Diameter of tube.	Radial velocity outward.	Rotational velocity.	Vertical velocity upward.
Feet.	*Feet.*	*Miles.*	*Miles.*	*Miles.*
4,200	.....	.....	.....	.....
4,193	3,402	7.0	14.1	0.04
3,901	506	1.0	94.4	2.50
3,599	400	0.6	119.5	3.90
3,301	290	0.6	164.0	7.40
2,999	250	0.5	189.0	9.90
2,398	204	0.4	233.0	14.90
1,802	178	0.4	268.0	19.80
1,499	168	0.3	284.0	22.20
1,201	158	0.3	300.0	24.70
601	144	0.3	328.0	29.60
479	144	0.3	333.0	29.70
0	134	0.3	354.0	34.60

A more thorough study of the data shows that the lower portion of the vortex tube is enlarged over these diameters on account of the friction due to disturbing the water, to the raising of the spray to a height of 500 feet when it is cast out of the tube, and to the indraught of air required to supply the vortex. The effect of this is to increase the size of the tube at the ocean to about 200 feet, and to reduce the rotating velocity to about 300 miles per hour, and the vertical internal draught to about 30 miles per hour. These dimensions and velocities characterize the largest tornado tubes, and together with the fall of internal pressure by the amount of 3 or 4 inches, they readily cause the destructive effects noted so conspicuously at Louisville, Ky., and St. Louis, Mo., in recent years.—*H. H. K.*

A NEW FIELD FOR KITES IN METEOROLOGY.

The following article, by A. Lawrence Rotch, is reprinted from Science, N. S., Vol. XIV, No. 350, pp. 412–413, September 13, 1901:

Although kites carrying recording instruments to a height exceeding three miles have rendered great services to meteorology at Blue Hill and elsewhere, they have been subject to the limitation of requiring a wind that blows at least 12 miles an hour. In certain types of weather, notably anticyclones, the winds are light and consequently observations with kites can rarely be obtained at these times. It also happens frequently that while the wind at the ground is sufficient to raise the kites it fails completely above the cumulus clouds so that the kites are unable to penetrate this calm zone.

By installing the kites and apparatus on a steamship, not only can kites be flown in calm weather, but observations may be made above the oceans where little is known about the conditions of the upper air. It is evident that a vessel steaming 12 knots an hour through a calm atmosphere will raise the kites to the height they would attain in a favorable natural wind, while the force of strong winds can be moderated by steaming with the wind. In this way kites can be flown on board a steamer under almost all conditions and probably more easily than on land, since the steadier winds at sea facilitate launching them. Wherever these observations in the upper air may be made, there is always a station at sea level and not far distant horizontally with which to compare them.

To test the practicability of this method of flying kites, experiments were undertaken on August 22, 1901, with the aid of my assistants, Messrs. Fergusson and Sweetland, upon a towboat chartered for this purpose to cruise in Massachusetts Bay. Anticyclonic weather conditions prevailed and a southeast wind blew from 6 to 10 miles an hour, but at no time with sufficient velocity to elevate the kites, either from sea level or from the summit of Blue Hill. With the boat moving 10 miles an hour toward the wind, and within an angle of 45° on either side of its mean direction, the resultant wind easily lifted the kites and meteorograph with 3,600 feet of wire to the height of half a mile.

While it is desirable to have a vessel that can be started, stopped, and turned at the will of the meteorologist, as was the case in the experiments described, it is nevertheless probable that soundings of the atmosphere can often be made from a steamship pursuing its regular course, and such are about to be attempted by me on a steamer eastward bound across the North Atlantic. Although observations above all the oceans are valuable, the exploration of the equatorial region is the most important, since, with the exception of a few observations on the Andes and on mountains in Central Africa, we know nothing of the conditions existing a mile or two above the equator. The need of such data to complete our theories of the thermo-dynamics and circulation of the atmosphere was urged by the Russian meteorologist, Woeikof, at the Meteorological Congress in Paris last year. North and south of the equator, within the trade wind belts, kites might be employed to determine the height to which the trades extend, and also the direction and strength of the upper winds, concerning which the high clouds, rarely seen in those latitudes, furnish our only information. In order to deduce the velocity recorded at the kite, it is necessary to ascertain the direction of this latter force, which could be done from the orientation of the kite.—*H. H. K.*

WEATHER BUREAU BULLETINS WANTED.

A correspondent desires copies of Bulletins No. 15, 20, 21, 24, and 27 to complete his set. Any person having one or more of these bulletins which he does not care to keep will confer a favor by notifying the Editor.—*H. H. K.*

CLIMATE AND CROPS: A PROBLEM WITH TWO SOLUTIONS.

The following letter was recently received by the Chief of Bureau from Mr. C. M. Donner, Secretary and Treasurer of the Hall's Island Farms, near Seabrook, Beaufort County, S. C.; it submits an interesting problem for consideration:

We have been for the last fifteen years interested in truck farming in this locality, and asparagus culture has been one of our specialties. You are probably aware that asparagus beds are to all intents and purposes permanent, the bushes dying off in the fall and the crop consisting of the new shoots which sprout up from the roots as soon as the temperature of the ground and the air is sufficiently high; our market is in the North, where good prices are paid as long as there is no supply from New Jersey, Long Island, etc. As soon as the more northerly produce appears in the market, prices drop to a level which leaves no profit to the southern grower, owing to the high freight he has to pay, there being no outlet for his produce near by.

You will at once perceive that an early commencement of spring is very necessary to the success of this business, that is to say, early, as compared with the season in the Northern States, as the crop is not harvested at once but brought into market daily, and the harvesting can be continued under favorable circumstances for more than two months; sometimes even three months.

We have a great interest in any apparent change in the climate, and also a good opportunity of observing such changes, as the asparagus plant is a pretty good indicator of the temperature of the air and ground.

Now we have observed that during more than ten years there has evidently, with minor fluctuations, been a steady retardation of what may be called "growing weather," so that whilst in 1890 we cut our first asparagus on January 9, and went on harvesting until after April 30, we only commenced cutting this year on March 21, and shall be very glad if we get more than six weeks altogether in which to ship our crop.

The Weather Bureau having all the necessary data can, of course, decide whether our impressions as to a gradual shifting of the seasons

in the South without a corresponding change in the North are based upon facts, and if so, it no doubt has formed theories regarding the same.

What mainly interests us is to know whether any conclusion has been reached as to the probable course the climate will take in the near future, that is to say, if it is at all likely that we have to deal with a fluctuation in the climate of which this is only the beginning, and which may extend over a considerable period, or if the climate may at any time return to its normal state.

In this connection it also occurs to us that we are in reality quite ignorant as to what may be considered the normal climate of South Carolina, and that there is a possibility that we are now returning to it, the preceding ten or twenty seasons being in reality abnormal ones.

If you will kindly give us the fullest information possible on this subject, which is of vital interest to us, and refer us to whatever literature may have a bearing upon it, we shall esteem it a great favor.

To the above letter the Chief of Bureau sent the following reply treating of the climatic question alone:

The subject concerning which you write is of transcendent importance; one that has been fruitful of much discussion during late years. It was brought to the front by the orange growers of Florida who, after having suffered from repeated disastrous freezes, naturally conceived the idea that the climate must have permanently changed. The pioneers of the middle west some years ago, in the belief that the rainfall to the westward was increasing, pushed out over the plains far beyond the borders of the humid region. After a year or so of abnormally heavy rainfall the natural conditions prevailed; conditions, it is needless to say, inimical to success in agricultural pursuits. Hundreds of persons were forced to abandon their claims and return to more humid regions.

Thus it is there arise from time to time, not only in this country but throughout the civilized world, apparently well grounded beliefs that the climate, either in respect to temperature or rainfall, has changed materially, or is slowly changing. That there have been marked changes in climate during the ages that have passed is clearly evidenced by the results of biologic and geologic surveys, not to speak of the results of equally important investigations that have been prosecuted in other branches of physical science. Such changes, however, occurred for the most part during the formative period of the earth's history and generally before it was inhabited by man. The occurrence of the Great Ice Age, the last important climate change, has been referred to purely astronomical causes, such as the secular or long periodic changes of the eccentricity of the earth's orbit and of the obliquity of the ecliptic, but there is not unanimity of opinion as to its probable cause.

The evidence of material change in climate during historic times is fragmentary and inconclusive. Strange as it may seem, instrumental data are not available in any part of the civilized world for a period longer than three hundred years, and even these are subject to an uncertainty of several degrees in the case of temperature, owing to the imperfections of the earlier instruments and methods. Then, too, the probable effect of man's occupancy of the earth is practically an unknown factor. Through his agency large portions of the earth's surface have been deforested and placed under cultivation. Water has been diverted from the streams and spread over the soil, thus transforming deserts into fertile plains. The latter in turn, through the varying fortunes of dynasties and empires, have again become arid and, with the onward march of progress, other portions of the desert regions of the globe have been brought under cultivation. While the total effect of such changes in the earth's surface as man has wrought is probably small, who can say that it has been absolutely nil?

It is the general belief in scientific circles that the radiating energy of the sun, upon which climate for the most part depends, has not altered within historic times, yet we can not argue constancy of climate from this fact alone, since the atmosphere becomes heated, not from the direct rays of the sun alone, but in great part from the ground by means of radiation, contact, convection, etc. The absorbing power of air for heat radiations is variable, depending somewhat upon the quality of aqueous vapor, carbonic acid, and dust that it contains. These, especially the latter, may have changed materially since the earth was inhabited by man. If we grant that the absorbing power of the atmosphere is subject to small variations from year to year we would still have an effect that would hardly be appreciable to the senses.

Passing now to the consideration of the facts named in your letter, I would say that the records of the Weather Bureau show that during the last fifty years there have been three marked cold periods in the South Atlantic States, viz, from 1852 to 1857, both inclusive; from 1871 to 1875, both inclusive; and from 1892 to 1901, both inclusive, a total of twenty-one years out of fifty. All of the years within the above-named periods were not uniformly cold; indeed, in the last-named period there were at least two normal winters, viz, those of 1894 and 1898. On the other hand, there occurred throughout the remaining periods of years cases of single cold winters, as that of 1878–79, and of two consecutive cold winters, as those of 1885–86 and 1886–87.

The damaging cold in the recent term of cold winters appears to have occurred, with but few exceptions, in February, and that fact may have impressed you more than would a continued cold in December or January. You have also unconsciously fallen into error in referring to the winter of 1889–90 as a standard of comparison. That winter was extraordinarily warm for the latitude of Charleston. In fact, the temperatures you experienced that season were appropriate to central Florida. There has not been another such winter as that of 1889–90 east of the Rocky Mountains since Weather Bureau observations began. You may remember that both November and December of 1889 were warm, pleasant months, and that there was practically no severe weather at Charleston during the entire winter. The warm weather was due to the fact that substantially all of the storms of the season passed across the country far to the north of Charleston, thus inducing warm southerly winds over the South Atlantic States. In cold years the interior of the country is covered by an area of high pressure, around the southern edge of which are found the conditions of heat and moisture necessary to the development of storms. You may recall that in cold winters the storms that visit your section generally approach by way of the lower Mississippi Valley or the Gulf of Mexico, and that they are almost invariably followed by cold northwesterly winds and several days of low temperature.

Why the storms of one year move in much higher latitudes than those of another year is one of the unsolved problems of meteorology.

We may add that inasmuch as the temperature and moisture of the soil is the primary consideration in the production of early spring crops, therefore the gardener must keep a record of the temperature at 3, 6, 12, and 15 inches below the surface of the soil if he wishes to understand the variations of his crops with the seasons. Such thermometer records should give indications as to when mulching and shading are needed, and enable one to predict quite closely the progress of development of roots, tubers, and sprouts.—*C. A.*

SEISMOMETERS IN METEOROLOGY.

Mr. F. Napier Dennison, of the Canadian Meteorological Service, stationed at Victoria, Vancouver Island, read a paper at the British Association at Glasgow on the seismometer as a weather forecaster. His paper in Symon's Meteorological Magazine for 1901 defends the idea that the seismograph can be used as a sensitive barometer. The seismographic pendulum points from the low barometer toward the high pressure. The enormous pressure taken off of the earth's surface within areas of low pressure and added to the pressure or weight over high areas, seems to make the crust of the earth bend like an elastic shell. Mr. Arthur Harvey, of Toronto, suggests that if at any station there be two good-sized seismometers of the pendulum type, oscillating at right angles, with perhaps a third between them, and if for convenience of observation the pens at the points of the swinging bars come close to each other, one would probably be able on the Pacific coast to tell the direction of an approaching low area.—*C. A.*

THE OBSERVATION OF SHOOTING STARS.

It is a very common matter for both regular and voluntary observers and occasional correspondents to mention the occurrence of a shooting star or bright meteor. Such events occur every day in many parts of the globe. Millions of meteors daily strike the earth's atmosphere and are burnt up, thereby adding a little to the mass of the earth and to the heat within the atmosphere; but the sum total of these effects is apparently inappreciable in meteorology. The real interest that attaches to the bright meteors is the effort to classify them according to the directions whence they come in space and the altitude and velocity with which they move. It is hardly worth while to mention the occurrence of a meteor unless the observer will add some approximate statement giving, as precisely as he is able to do it, the angular azimuth and altitude of that point in the sky where he first saw it and

where it finally disappeared. Some persons are accustomed to estimate angles so that they can give this data directly, others know the names of the stars and constellations and can describe several points in the meteor's path by mentioning the neighboring stars, but in this case the exact time of day must also be given. Occasionally a bright meteor will cast the shadows of buildings and trees on the ground or of window sashes on the floor or of the observer himself, and by marking at once the location of such shadows and by measuring subsequently the observer may determine the altitudes and azimuths of several points in the path of the meteor. These angular measurements give us the apparent altitude and azimuth of a portion of the path of the meteor, and are the data of most importance. When several observers at different stations report such measurements as these, they are easily combined together and give us a fair determination of the true altitude and motion of the meteor.

If the meteor is a very bright one, the observer is almost certain to hear a noise—it may be a very loud one—within a few minutes after the meteor disappears, but not, strictly speaking, at the time of the meteor, as some observers mistakenly imagine. It is therefore best for the observer to hold his watch before him as soon as the meteor appears and record the minutes and seconds of its appearance; then wait a few minutes until the sound is heard, when the minutes should be again recorded. If the watch has no second hand, the observer has but to look sharp at its face, and he will see that he can subdivide the spaces between the minute dots into small fractions and can record the minutes and fractions of minutes, which will be almost as good as the seconds themselves. With very little practise, one may accustom one's self to making the records in minutes and tenths of minutes in the ordinary decimal style.

Photographs of meteor tracks, showing also the stars in their proper relations, are made at Yale College Observatory during the important showers of meteors. Those who desire to do similar work should consult the director, Professor Elkins, as to the apparatus and methods.

As meteors become luminous at 50 to 150 miles above the earth's surface, where the gaseous pressure is inappreciable, it is plausible that the heat is produced by the collision of the meteor with minute particles of matter that attend the earth in its annual course and correspond to the upper atmosphere, whose existence is made plausible by the recent studies of Prof. R. S. Woodward. From these particles we may receive the reflected sunlight that is observed as the zodiacal light.—*C. A.*

THE SOUTH POLAR EXPEDITIONS.

We quote the following from an article published in the National Geographic Magazine for October, 1901, by Dr. Georg Kollm, Editor and Secretary of the Geographical Society of Berlin:

The object of the German Antarctic Expedition is the scientific exploration of the south polar regions, particularly on its Indo-Atlantic side.

In pursuance of this object, it left Germany on the 11th of August, 1901, and is proceeding to Three Island Harbor, Royal Sound, in the Kerguelen Islands, where a base station will be established. In December, 1901, it is expected that the expedition will be ready for its real work of exploration and will push on toward the south as far as practicable. Should land be reached, a station will be founded and maintained for a year and the ship wintered there. Whether any later attempt to push still farther south will be made is not yet determined. It will not, at all events, be undertaken unless the conditions should prove particularly favorable.

The expedition has general orders to remain until its tasks are satisfactorily executed, but in any case not to remain beyond June, 1904, at which date it must report at some harbor in communication with home. Should no news be received of the expedition by the first of June of that year, it will be in order to consider the expediency of fitting out a relief ship.

The leader of the expedition, Dr. Erich von Drygalski, of Berlin, was appointed by His Majesty the Emperor, and has thoroughly studied the problems of the south polar regions. He has been placed in absolute control of the south polar ship *Gauss*, its personnel and equipment. All the arrangements for the work to be carried on from the time the ship left Germany are under his direction and subject entirely to his control. Marine laws regulate the position of the ship's company toward its leader.

The expedition is an undertaking of the German Empire and is fitted out through the Secretary of State for the Interior, Herr Dr. Graf von Posadowsky-Wehner. It sails under the Imperial Service flag, and its officers and men bear special service designations authorized from the highest quarters. It is thoroughly well equipped, both scientifically and practically, for its mission. In addition to the funds provided by the Empire, about 40,000 marks ($10,000) in small amounts have been contributed by private societies. The interest aroused in the expedition throughout the Empire has been very great, and has led to the presentation of many gifts and offerings which will add much to the efficiency of the equipment.

* * * * * * *

The scientific members of the expedition are Prof. Dr. E. Vanhoffen, Kiel, for zoology and botany; Dr. H. Gazert, Munich, physician and bacteriologist; Dr. E. Philippi, Breslau, for geology and chemistry; Dr. F. Bidlingmaier, Lauffen, for terrestrial magnetism and meteorology.

* * * * * * *

The personnel selected for the Kerguelen station consists of Dr. E. Werth, from Munster, as biologist; Dr. K. Luyken, from Munich, as meteorologist, and two seamen.

The Kerguelen station is chiefly intended for magnetic and meteorological observations, which, as well as similar work conducted by the German chief expedition, will be carried on in accordance with the international program agreed on with England. This program has been sent to all States having magnetic-meteorological stations, as well as to the stations themselves, with the request for cooperation. Many have already signified their readiness to do so. It will also be followed at the station established by the Argentine Republic on Staten Island. Cooperation in all other sciences with the English expedition and all other expeditions to be sent out by other States has been regulated in the best manner by the division into departments of work.

Mention has already been made of the kite work that will be undertaken by this expedition.[1]

On August 6, 1901, the *Discovery* sailed from Cowes carrying the British National Antarctic Expedition under command of Com. Robert F. Scott, R. N., with Dr. George Murray as scientific director.

The proposed work of the party has been carefully outlined by the presidents of the Royal Society and of the Royal Geographical Society, and we quote from sections 1, 2, 10, 11, and 19 of their instructions to the commander of the expedition.

1.—The Royal Society and the Royal Geographical Society, with the assistance of His Majesty's Government, have fitted out an expedition for scientific discovery and exploration in the antarctic regions, and have entrusted you with the command.

2.—The objects of the expedition are: (*a*) To determine, as far as possible, the nature, condition, and extent of that portion of the south polar lands which is included in the scope of your expedition, and (*b*) to make a magnetic survey in the southern regions to the south of the fortieth parallel, and to carry on meteorological, oceanographic, geological, biological, and physical investigations and researches. Neither of these objects is to be sacrificed to the other.

10.—You will see that the meteorological observations are regularly taken every two hours, and, also, in accordance with a suggestion from the Berlin committee, every day at Greenwich noon. It is very desirable that there should, if possible, be a series of meteorological observations to the south of the seventy-fourth parallel.

11.—As regards magnetic work and meteorological observations generally, you will follow the program arranged between the German and British committees, with the terms of which you are acquainted.

19.—If, on the other hand, you should decide not to winter, you will bear in mind that it is most important to maintain scientific observations on land throughout the winter, and therefore, if you are able, in consultation with the director, to find a suitable place for a landing party between Cape Johnson and Cape Crozier, and decide that such a party can be landed and left without undue risk, the following instructions will apply:

(*a*) You will land a party under the command of such person as you may appoint. Such party shall include the director, the physicist, and one of the surgeons, and such other persons as you may consider desirable, but no person is to be left without his consent in writing, which you will be careful to obtain and preserve.

(*b*) You will give every practicable assistance in establishing on land this party, which you will supply with all available requisites, in-

[1] See MONTHLY WEATHER REVIEW for April, 1901, p. 177.

cluding a dwelling hut, and observer's hut, three years' provisions, stores, fuel, sledges, and dogs.

(*c*) No landing party is to be established on any other part of the coast than that between Cape Johnson and Cape Crozier, as it is above all things essential that in case of accident the approximate position of the party should be known.

(*d*) Before it is so late as to endanger the freedom of your ship, you will proceed north of the pack and carry out magnetic observations with sounding and dredging over as many degrees of longitude (and as far south) as possible, so long as the season and your coal permit, and then return to your base station, whence you will telegraph your arrival and await further instructions.

The National Geographic Magazine for November, 1901, has the following note:

The *Antarctic*, carrying the Swedish south polar expedition, sailed from Gothenburg October 16. Prof. Otto Nordenskjold, the leader of the party, states that they will proceed to Buenos Ayres and Terra del Fuego and then push as far south as is found possible. When winter comes on a party of six under Nordenskjold will land and spend the winter making scientific observations. The *Antarctic* meanwhile will return to Terra del Fuego in charge of one of the scientists of the party, who will conduct researches in that little explored country. Thus, while the Germans are exploring the regions south of the Indian Ocean and the British that south of the Pacific Ocean, Dr. Nordenskjold and his party will be at work in the regions south of the Atlantic Ocean. Professor Ohlin and M. K. A. Anderson go as zoologists, Dr. Bodman as hydrographer, Dr. Skottoberg as botanist, and Dr. Ekolof as medical officer.

With these three well equipped expeditions in the antarctic regions and the numerous expeditions actively engaged in the far north,[1] we may reasonably hope that our knowledge of geography and meteorology will be materially advanced.—*H. H. K.*

ANSWERS TO CORRESPONDENTS: POPULAR QUERIES ABOUT RAIN, HAIL, WIND, AND FROST.

A correspondent from Northfield, Mass., writes as follows:

The following is a list of remarkable phenomena I have noted from successive readings of different weather periodicals. Some may interest you and some you may be able to explain.

1. Fifty nine voluntary observers in New York State reported snow every month last winter between October and May, and the following reported a total fall of more than 100 inches:

	Inches.
Adams	334.5
Watertown	184.3
Jamestown	161.0
Gabriels	142.0
Humphrey	135.2
Honnedaga Lake	128.4
Bouckville	118.2
Alden	108.5
Lowville	105.4
Keene Valley	103.5
Brockport	102.5

It is not remarkable that one storm, or a succession of storms, should give one or more stations more rainfall than others; but last winter was dry, with light snowfall, in the northeastern United States. Several mornings I noticed cirrus streaks radiating from a point beyond the western horizon. As the sun rose they burned off and the day became clear, and no more signs of the storms were observed; but the following daily papers always told of a great snowfall in some section in New York State, about the size of a county, several hundred miles west of here.

If local rainfalls in the lower Lake region are explicable by the proximity of large bodies of water, how are local snowfalls to be explained when this water is frozen over? Why do we not get local snowfalls of similar depths in the Northeast when our snow covering is equal to that of New York State?

2. What causes Amarillo, Tex., to have comparatively frequent terrific gales? Those from the westerly quarter are often 80 miles per hour. (April 4, 1901, 80 miles nw.) The papers never mention them, so presumably the inhabitants are acclimated; but how do the crops stand it?

3. Why does a northeast storm always give light precipitation at Nantucket and heavy at Block Island?

4. Why is the wind velocity and the total movement always less at Nashua, N. H., than at the other northeastern stations?

5. What is a "dry thunderstorm"? (Recent Washington Weather Bureau Bulletin).

6. Why is Marquette, Mich., a great snow center (as well as Rochester, N. Y.)?

7. Is not the limit of thunderstorm frequency the limit of the seabreeze?

8. But for the alleviation afforded by local climatic peculiarities, would not a hot wave in the Northeast be as destructive as in the West, being identical?

9. Is not a hailstorm a whirlwind in the clouds?

10. Is not a western whirlwind a cyclone in miniature?

11. Would a West Indian hurricane wind not badly damage the solidly built structures of the northern United States, apart from wave force? I understand that southern buildings are generally light and poorly constructed.

12. Are not Vermont blizzards as severe as those of Dakota, excepting that they are broken by mountains, while the population is not so scattered and liable to lose individual members?

13. How accurately can extreme wind pressure be measured by a Weather Bureau anemometer? If one mile of wind passed at the rate of — miles per hour, as in the Galveston hurricane, what should you call the extreme velocity?

14. It is reported that the temperature at Fort Kent, Me., was once measured at 60° below zero. Would not this prove the East liable to the same degree of cold as the West?

15. Is not the wind velocity during a northeast storm at Block Island occasionally as great as in a West Indian hurricane, and do not buildings escape damage only because they are erected beyond the reach of wave force?

16. Although thunderstorms run independently of river valleys, do not their cumulus portions choose such valleys whenever convenient?

17. Why is Grafton, N. H., the great frost center of the northeastern weather service?

18. Does not the snowfall at Jacksonville, Vt., and other places in the Appalachians compare favorably with that of the Pacific coast range?

19. Are not the droughts and the deluges of the East similar to those of the West, allowing that the droughts may be more local in the East and the cloudbursts less extensive in the West?

These queries are just such as may occur to many others and in replying to them an attempt will be made to give general explanations; we may, therefore, sometimes include several under the same heading.

1, 6, and 18. The Great Lakes do not entirely freeze over during the winter. Immense ice fields form near the shores and are carried back and forth by the wind, accumulating in great quantities on the windward shore, whichever that may chance to be. Whatever influence the lake water exerts upon rainfall in summer it may therefore exert upon snowfall in winter. In fact, an onshore wind in winter usually causes cloudiness over the land, since it has been warmed and dampened while passing over the water, only to become cooled, and in consequence have its moisture condensed when it reaches the land. The cloudiness in winter at stations on the east and south shores of the Great Lakes is proverbial, as also the number of days with snowfall. But the excessive snows referred to by our correspondent cannot be attributed to proximity to large bodies of water alone. The complete answer to this question would require an exhaustive treatise on precipitation. It is sufficient to say here that the topography of any given section, as also its position relative to the normal path of storm centers has much to do with the amount of snowfall. Local topography is often not so important as are general atmospheric conditions. In general, mountains are known to favor the formation of cloud and rain or snow because they force the winds to rise up as they pass over them, and it is rising air that cools to cloud and rain. This is the primary cause of heavy rain and snow up to certain altitudes in mountainous countries. A gently rising low shore line accomplishes the same end because winds blowing toward it from the water meet with greater resistance and turn upward as they surmount the sluggish air near the ground. Winds blowing parallel to the long axes of such lakes as Michigan, Erie, and Ontario acquire great velocity over the water surface and must pile up the air in great volumes at the leeward ends where the cloud and snow are observed. The rainfall in these localities can scarcely be called local rains, unless we

[1] See the National Geographic Magazine for May, 1901, which mentions eight arctic expeditions now in the far north, or planning for active work in that region.

give the term local a much greater extension than is ordinarily done. When southerly winds preceding a low pressure are underrun by cold northerly winds, the former air is elevated and snow or rain results. The presence of a lake may increase the precipitation, but is not the sole cause of it.

It is not correct to call the storms that occurred in New York during the winter of 1900–1901 *local;* they were general storms, but were much more severe in some sections than in others. New England has similar storms, but in general the total snowfall is greater in northern New York and Michigan than in States farther east. The precipitation on the mountains of the Pacific coast is heavier than in any other part of the United States, and in the elevated portion of this region the snowfall is heavier than on the Appalachian Mountains. This is as one would expect, since in the United States the prevailing winds are from the west, and therefore the Pacific coast mountains, besides being higher than the Appalachians, are more directly exposed to oceanic winds.

2. Texas is more or less under the influence of monsoon winds that blow from the continental cold regions of high barometric pressure, southward toward the Gulf in winter and from the Gulf toward the interior or continental low in summer. During the passage of special areas of marked high or low barometer these winds are greatly augmented, causing severe cold waves in winter and drying winds or droughts in summer.

The maximum wind velocity (80 miles per hour) reported from Amarillo in the April REVIEW appears to be correct, but such a velocity is very rare and the question is not based on facts.

3. The exposure of rain gages has much to do with the catch of rain. Unfortunately, it is not always possible to expose Weather Bureau gages in the best manner or the best locations. The annual catch of the gage at the Block Island station is greater than at the Nantucket station without any apparent cause, and it may be due to differences in exposure. In general, the distribution of rainfall and the catch of the gages vary with the wind quite independently of each other.

4. The exposure of anemometers, and particularly their height above ground has very much to do with their records of the wind. The instruments must also be kept well oiled and in perfect condition. The Weather Bureau has no anemometer at Nashua, N. H., and it is not known how reliable are the records that are obtained there. Professor Marvin has shown that gusty winds give higher records than steady winds of the same average velocity.

5. Frequently thunder will be heard from a heavy cumulus cloud, and there may be a strong wind blowing out from it, raising a great cloud of dust, and causing a marked fall in temperature, but without any rainfall. We thus have all the phenomena of the ordinary thunderstorm except the rainfall. Such storms may be called dry thunderstorms. The term has been employed by the Weather Bureau to signify that thunder has been heard or lightning seen at a station, but no rain has fallen there, although it may have fallen at a distance.

7. There does not appear to be any relation between thunderstorm frequency and the limit of the sea breeze. As is well known, thunderstorms are frequent and severe on our central plains.

8. The States east of the Mississippi are not subject to long-continued descending hot, dry foehn winds, such as sometimes sweep some of our western States. Furthermore, the greater humidity of the air on the Atlantic seaboard and the greater cloudiness by day cuts off a greater percentage of the direct solar radiation and prevents the soil and lower atmosphere of the Atlantic coast district from becoming so intensely hot. All these causes also retard evaporation from the earth. In consequence, even if the rainfall on the Atlantic coast were no greater than on the western plains, the coast would not suffer so much from drought.

9. Hail usually occurs with thunderstorms of marked severity, probably because the cumulo-nimbus clouds extend to unusual heights, where the temperature is below freezing. There is often a cyclonic circulation about a thunderstorm, and to this extent a hailstorm is a whirlwind in the clouds, but in many thunderstorms and hailstorms the air rolls over and over without a local whirlwind. A good description of hail clouds is given in the MONTHLY WEATHER REVIEW, Vol. XXII, p. 292.

10. By a "western whirlwind" the author probably means a tornado. This must not be confounded with a cyclone, since they are entirely distinct phenomena. It is not precise to say a tornado is a miniature cyclone or a miniature hurricane. The following are the definitions for hurricane, tornoda, and cyclone, as given by the Editor in the MONTHLY WEATHER REVIEW, Vol. XXI, p. 225:

> A hurricane or "typhoon" is a large stormy area, often several hundred miles in diameter, within which violent winds circulate around a center. The center of a hurricane or "typhoon" is a comparatively calm region, where even the clouds break away and the rain ceases, whereas the center of a thunderstorm is the region of greatest intensity of wind, rain, or lightning. A tornado is a very much smaller region, usually less than 2 miles in diameter, within which even more violent winds prevail. In the typical tornado these violent winds circulate about a central axis, rapidly ascending at the same time and forming a funnel-shaped cloud whose base is at the average cloud level; but many destructive winds have been classed as tornadoes which are not circulating about such a funnel-shaped cloud or vertical axis, but which are either blowing straight ahead on the earth's surface, as in the "derecho" or straight line wind, or which have a quasi rotation around a horizontal axis, as in the blast that accompanies the front of a "norther" or the gust in front of the heavy rain of a thunderstorm. We shall endeavor, as far as possible, to separate the true tornado, which is rare, from the numerous destructive winds, squalls, and gusts which are popularly called tornadoes, hurricanes, cyclones, tourbillons, and other high-sounding names.
>
> The term "whirlwind" is applied to any revolving mass of air, and includes at one extreme the hurricane and at the other extreme the dust whirl of our street corners.
>
> A "cyclone" is a mass of air circulating around a center; the lower portion of the air near the earth's surface has a vorticose movement in toward a center, while the upper layers have a movement out from a center; the line joining the upper and lower centers is the axis of the cyclone; the direction of rotation is the same in both upper and lower layers. In the Northern Hemisphere this rotation is said to be in a negative direction, or opposite to the diurnal motion of the sun in azimuth, and opposite to the movement of the hands of a watch lying with its face uppermost.

The term cyclone includes the idea of an outflow overhead and a rotation in a specific direction.

11. While the best modern types of buildings of steel and stone would undoubtedly be able to stand in the face of such violent hurricanes, and even tornadoes, yet their windows and roofs would undoubtedly suffer, and then damage to the interior would follow. Gen. E. P. Alexander, of Georgetown, S. C., has written interestingly on this subject in the MONTHLY WEATHER REVIEW for May, 1896, Vol. XXIV, p. 153.

12 and 14. The terrific winter gales of the Dakotas, accompanied by stinging cold and blinding snow, have no counterpart in the East. Vermont experiences low temperatures, high winds, and heavy snows, but never the combination that is met with on the plains in the Northwest. It is difficult to state what the winds would be in Vermont "if they were not broken by mountains;" observations are wanting and queries would be useless.

The New England States do not experience such low temperatures as have been reported in Montana and Dakota. How can the report from Fort Kent be substantiated?

13. Various investigations have shown that in taking the average wind movement, as recorded by the Weather Bureau or small-size Robinson anemometer, the variations are averaged out, and that these variations are fully 33 per cent above and below the mean; that is to say, if a single mile of wind

is observed to blow at the rate of 72 miles per hour, there will be moments during the passage of the mile in question in which the velocity will probably be as high as 96 miles per hour and at other moments as low as 48 miles per hour. (See Professor Marvin's Bulletin on Anemometry, Circular D, Instrument Division).

15. The highest velocity ever recorded at Block Island is 84 miles per hour. At Hatteras, in 1899, 105 miles, and at Galveston, in 1900, 84 miles per hour were recorded before the instruments were blown down, but it is estimated that at Galveston the wind attained a velocity of at least 120 miles per hour.

The highest velocity actually recorded on self-registers in the United States, except at Mount Washington and Pikes Peak, is 138 miles per hour at Cape Lookout, N. C., August 18, 1879, just before the anemometer was blown away. The estimated velocity after the anemometer was blown down was 165 miles per hour. At Mount Washington 186 miles was observed with a heavier anemometer than we now use, and needing a large correction.

Our anemometers do not generally withstand the terrific force of West Indian hurricanes or of the true tornadoes, but this is not wholly due to the great horizontal speed of the wind; it is largely owing to such other matters as the following: (1) The rapid rotation sets up strains within the anemometer that tear it to pieces; (2) the horizontal wind alternates with violent up or down gusts that cause the revolving arms to lift the spindle up out of its socket; (3) the inertia and pressure of the wind against the hemispheres is often doubled by the impact of the raindrops carried along with the wind; (4) the cup and arms become clogged with snow or frost formations, and thus offer a much greater resistance than the instrument was intended to bear; (5) the debris of buildings and trees carried along by hurricane winds tear the anemometer from its supports.

16. Observations do not generally show that thunderstorms follow valleys. We would hardly expect them to do so when we remember that the base of a thunderstorm cloud is about half a mile above the surface and its summit from 2 to 6 miles above. The thunderstorm cloud may start in a valley, but soon outgrows the influence of small local features. The study of thunderstorms requires a thick network of stations and large topographic maps. It would be well if such study could be carried out in greater detail for specific small areas of 10 or 20 miles in diameter.

17. Grafton, N. H., has an elevation of over 300 feet, which is considerably above the valleys of the Merrimac and the Connecticut rivers, between which it lies. Its altitude is, therefore, conducive to frosts, since the rate of radiation of heat from the earth at night increases with the elevation. Hills and mountains are not so liable to frosts as lowlands at their immediate foot, since the cold air gravitates down the sides of the former to the valleys below, thus causing early frosts in the valleys. Does not the Grafton station receive such cold air drainage from neighboring higher land? There must be many similar frosty spots in New Hampshire and Vermont, not provided with voluntary observers, therefore we doubt whether Grafton really is a "great frost center."

19. The average rainfall diminishes rapidly as we go west from the Mississippi, but so-called cloudbursts occur in all sections alike, the most intense being among the mountains of the far west. The Gulf coast is liable to excessive rainfalls, and so are all the States east of the Rocks Mountains, but principally during thunderstorms or hurricanes. For a full discussion of this subject, see Weather Bureau Bulletin D, p. 52.

For a more complete discussion of these various subjects, the reader is referred to the special publications of the Weather Bureau, a list of which is given in the MONTHLY WEATHER REVIEW for May, 1901, p. 216.—*H. H. K.*

WEATHER BUREAU MEN AS INSTRUCTORS.

Mr. H. W. Richardson, Local Forecast Official, Duluth, Minn., has arranged to deliver a course of lectures before the West Superior (Wisconsin) Normal School during the present school year.

The first of the series was given in the Weather Bureau office at Duluth before the class in physiography, and such subjects as instruments and observations, the weather elements, the general movements of highs and lows, and weather maps and weather forecasting were very briefly considered.

On September 24 the second lecture of the series was delivered at the Assembly Hall of the school before the faculty and students to the number of about 300, the subject being the United States Weather Bureau.

Mr. J. Warren Smith, Section Director, Columbus, Ohio, lectured upon "Weather" before the seventh grade teachers' association of that city on September 28. This lecture was to be followed by two others, on October 1 and 3, respectively, before this same association of teachers, who now have meteorology included among the subjects they are to teach.—*H. H. K.*

CORRIGENDA.

MONTHLY WEATHER REVIEW for July, 1901, p. 299, line 10, for "Ammerschweid" read "Ammerschweier." In the table on same page, line 1, under barometer (corrected) for "756.5" read "759.0." In the same column, opposite 9.05 a. m., insert "746.5."

Under "Remarks," opposite 11.23½ a. m., insert "We approach the cumulus turrets that rise from the cloud sea much higher than the balloon."

MONTHLY WEATHER REVIEW for July, 1901, p, 317, column 1, line 12, dele "Wis." Back cover, table of contents, column 2, line 11, dele "Wis."

MONTHLY WEATHER REVIEW for August, 1901, page 354, column 1, line 18, for "mentioning" read "maintaining."

THE WEATHER OF THE MONTH.

By ALFRED J. HENRY, Professor of Meteorology.

CHARACTERISTICS OF THE WEATHER FOR SEPTEMBER.

The rainfall of September was heavier than it has been in any September during the last ten years. In other respects the weather was not greatly different from the normal for the season. There were no destructive storms of a general nature and few severe local storms.

In the South Atlantic States, away from the coast, the rains were unusually heavy as in the preceding month, and in the middle Missouri and middle Mississippi there was a second area of heavy rains, culminating in eastern South Dakota with a fall of about four inches above the seasonal average. The rain on the middle and south Pacific coasts was also in excess of the seasonal average.

PRESSURE.

The distribution of monthly mean pressure is graphically shown on Chart IV and the numerical values are given in Tables I and VI.

Mean pressure was below the normal generally west of the ninetieth meridian, except along the northern boundary and in the British Possessions. It was normal or slightly above in the Lake region and the Ohio Valley. In respect to departures from the normal, monthly mean pressure for September was practically the same as in the corresponding month of 1900. Mean pressure generally rises from August to September, the rise being greatest over the eastern part of the country. In the last ten years there have been but three Septembers during which mean pressure over the greater part of the country was lower in September than in August.

TEMPERATURE OF THE AIR.

The distribution of monthly mean surface temperature, as deduced from the records of about 1,000 stations, is shown on Chart VI.

The month was abnormally cool in the northwest and generally throughout the Pacific coast and the Plateau region. Temperature was also below the average in the Gulf States and thence northeastward over the mountain regions of West Virginia, Virginia, North and South Carolina, and Georgia. Maximum temperatures of 100° were registered in southwestern Texas and at a few isolated places in the northern part of the State, also in western Arizona and southern California. A maximum temperature of 90° and over was not registered in the mountain districts east of the Mississippi, nor in the Lake region and New England. Freezing temperatures were recorded in the northern part of Michigan, in Minnesota, the Dakotas, and generally throughout the Rocky Mountain region.

The average temperature for the several geographic districts, and the departures from the normal values are shown in the following table:

Average temperatures and departures from the normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	10	62.4	+ 1.7	+ 0.8	+ 0.1
Middle Atlantic	12	68.2	+ 1.1	+ 1.3	+ 0.1
South Atlantic	10	74.6	+ 0.4	− 9.7	− 1.1
Florida Peninsula	7	79.4	+ 0.2	−13.3	− 1.5
East Gulf	7	75.7	− 0.3	− 8.3	− 0.9
West Gulf	7	76.0	− 0.1	+ 6.7	+ 0.7
Ohio Valley and Tennessee	12	68.4	− 0.3	− 3.5	− 0.4
Lower Lake	8	64.2	+ 1.0	+ 2.0	+ 0.2
Upper Lake	9	59.8	+ 0.8	+10.9	+ 1.2
North Dakota	8	54.0	− 2.6	+23.3	+ 2.6
Upper Mississippi Valley	11	65.4	+ 0.5	+16.0	+ 1.8
Missouri Valley	10	64.5	− 0.7	+26.4	+ 2.9
Northern Slope	7	55.1	− 3.0	+16.4	+ 1.8
Middle Slope	6	68.0	+ 0.2	+13.8	+ 1.5
Southern Slope	6	72.9	+ 0.9	+ 7.8	+ 0.9
Southern Plateau	15	67.8	− 1.2	+ 2.3	+ 0.3
Middle Plateau	9	57.7	− 2 6	+ 8.5	+ 0.9
Northern Plateau	10	54.9	− 3 0	+ 8.8	+ 1.0
North Pacific	9	56.1	− 1.3	− 8.2	− 1.0
Middle Pacific	5	61.5	− 1.7	− 4.6	− 0.5
South Pacific	4	65.7	− 2.6	+ 1.3	+ 0.1

In Canada Prof. R. F. Stupart says:

The temperature was below the average from the mainland of British Columbia as far as, and including the Lake Superior district, and above the average elsewhere in Canada except in the extreme northeastern portion of the Province of Quebec where the average was just maintained. Over the greater part of the Northwest Territories the deficiency was from 6° to 7° degrees, while in the Maritime Provinces the excess was from 3° to 4°, and in Ontario from 1° to 3°.

PRECIPITATION.

The rainfall was 75 per cent or more of the normal in all but two of the geographic districts into which the country has been divided. The rainfall in the Missouri Valley was unusually heavy, being almost double the normal for the season. The rainfall was also very heavy in the western Gulf States with 145 per cent of the normal, North Dakota, 148 per cent, northern slope, 175 per cent, and the northern Plateau, 177 per cent. Heavy rains for the season also fell on the middle and south Pacific coasts.

Average precipitation and departure from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	10	3 06	97	−0.1	+ 0.4
Middle Atlantic	12	3.20	84	−0.6	− 0.8
South Atlantic	10	5.33	100	0.0	+ 1.7
Florida Peninsula	7	7.44	100	0.0	+ 5.8
East Gulf	7	3.38	79	−0.9	+ 0.1
West Gulf	7	5.76	145	+1.8	− 9.2
Ohio Valley and Tennessee	12	2.84	97	−0.1	− 7.1
Lower Lake	8	2.92	100	0.0	− 1.0
Upper Lake	9	2 86	83	−0.6	− 4.8
North Dakota	8	2.16	148	+0.7	+ 1.2
Upper Mississippi Valley	11	3 22	100	0.0	− 7.8
Missouri Valley	10	4.66	197	+2.3	− 4.7
Northern Slope	7	1.63	175	+0.7	+ 1.6
Middle Slope	6	1.58	89	−0.2	− 5.5
Southern Slope	6	1.83	75	−0.6	− 3.5
Southern Plateau	15	0 40	50	−0.4	+ 0.9
Middle Plateau	9	0.22	32	−0.5	+ 0.3
Northern Plateau	10	1.84	177	+0.8	− 1.1
North Pacific	9	3.00	97	−0 1	− 0.1
Middle Pacific	5	1.91	269	+1.2	+ 0.4
South Pacific	4	0.20	200	+0.1	+ 2.0

Snow fell in the mountain districts of California and quite generally in the Rocky Mountain region from Colorado northwestward as far as the field of observation extended.

HAIL.

The following are the dates on which hail fell in the respective States:

Arkansas, 11. California, 22, 23, 24. Colorado, 2, 3, 6, 7, 9, 13, 20, 29, 30. Georgia, 10. Idaho, 3, 22, 23. Indiana, 18. Iowa, 25, 38. Kansas, 10, 13. Maryland, 1, 15. Massachusetts, 11. Michigan, 12, 17, 18. Minnesota, 15, 16, 24, 27, 28, 30. Missouri, 9, 10, 13. Montana, 4, 14, 15, 20, 26, 28. Nebraska, 6, 8, 11, 24, 26. Nevada, 2, 3, 22, 23. New Jersey, 12, 15. New Mexico, 1, 2, 8, 9, 10, 27, 29, 30. New York, 11, 15, 28. North Dakota, 13, 14, 24, 30. Ohio, 18. Oregon, 25, 26. Pennsylvania, 1, 11. South Dakota, 6, 13, 15, 24, 25, 28, 30. Tennessee, 16, 17. Texas, 14. Utah, 3. Virginia, 10. Washington, 26. West Virginia, 9. Wisconsin, 15, 18, 27. Wyoming, 3, 6, 10, 24.

SLEET.

The following are the dates on which sleet fell in the respective States:

California, 23. Idaho, 22. Michigan, 18. Minnesota, 16, 17. Montana, 6, 7. North Dakota, 29. Ohio, 18. South Dakota, 11, 15. Utah, 24. Wyoming, 24.

In Canada Professor Stupart says:

The precipitation was much above the average in the Northwest Territories and Manitoba; average or a little above over the larger portion of British Columbia; above the average along the south shore of Nova Scotia and below in all the remaining portions of Canada, except at a few places in Ontario where it was also above the average. In the Territories and Manitoba the excess was from one and a half to three inches, and snow was generally recorded on more than one occasion. In Quebec the deficiency was an inch and over in nearly all portions of the Province, and in Ontario it was for the most part from a tenth to half an inch, except at Peterboro and Welland where it reached 1.70 and 2.10 inches, respectively. The chief excesses reported in Ontario were Ridgetown 1.32 inches, Stony Creek 0.9 of an inch, Brantford and Orilla 0.8 of an inch. Halifax recorded as much as three inches and a quarter above the average, while Chatham, N. B., was an inch below the average.

HUMIDITY.

The averages by districts appear in the subjoined table:

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	82	0	Missouri Valley	68	+1
Middle Atlantic	79	+2	Northern Slope	68	+15
South Atlantic	81	0	Middle Slope	62	+4
Florida Peninsula	83	+1	Southern Slope	65	+3
East Gulf	77	0	Southern Plateau	37	−5
West Gulf	73	−1	Middle Plateau	34	−3
Ohio Valley and Tennessee	76	+3	Northern Plateau	58	+6
Lower Lake	74	0	North Pacific Coast	76	−5
Upper Lake	78	+2	Middle Pacific Coast	64	−4
North Dakota	76	+11	South Pacific Coast	68	+3
Upper Mississippi	70	−2			

SUNSHINE AND CLOUDINESS.

The distribution of sunshine is graphically shown on Chart VII, and the numerical values of average daylight cloudiness, both for individual stations and by geographical districts, appear in Table I.

The averages for the various districts, with departures from the normal, are shown in the table below:

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	4.5	−0.5	Missouri Valley	4.5	+0.5
Middle Atlantic	4.7	−0.1	Northern Slope	5.2	+1.2
South Atlantic	4.7	−0.1	Middle Slope	4.0	+0.8
Florida Peninsula	5.9	+0.4	Southern Slope	4.4	+0.8
East Gulf	4.5	+0.1	Southern Plateau	1.3	−1.0
West Gulf	4.2	−0.1	Middle Plateau	1.6	−0.9
Ohio Valley and Tennessee	4.0	−0.4	Northern Plateau	5.1	+1.0
Lower Lake	4.6	−0.2	North Pacific Coast	5.0	+0.1
Upper Lake	5.6	+0.5	Middle Pacific Coast	3.6	+0.8
North Dakota	5.9	+1.6	South Pacific Coast	2.5	0.0
Upper Mississippi	4.4	+0.2			

WIND.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Buffalo, N. Y.	16	53	sw.	Mount Tamalpais, Cal.	29	69	nw.
Cape Henry, Va	18	56	ne.	Point Reyes Light, Cal.	1	52	nw.
Do	19	50	ne.	Pueblo, Colo	19	50	n.
Denver, Colo	24	50	nw.	San Juan, Porto Rico	12	52	se.
Modena, Utah	23	60	sw.	Santiago de Cuba	13	54	se.
Mount Tamalpais, Cal.	12	55	nw.	Sioux City, Iowa	11	50	se.
Do	23	53	sw.				

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IV, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—Reports of 2,629 thunderstorms were received during the current month as against 2,563 in 1900 and 5,891 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country were most numerous were: 11th, 255; 10th, 210; 15th, 198.

Reports were most numerous from: Nebraska, 234; Missouri, 163; Kansas, 156.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz: 24th to October 2d.

In Canada: Thunderstorms were reported as follows: Halifax, 13; Grand Manan, 16; Yarmouth, 5, 13; Charlottetown, 14; Quebec, 7, 16; Montreal, 7, 16; Toronto, 10, 12; White River, 28; Port Stanley, 12; Parry Sound, 16, 23; Port Arthur, 27, 28; Winnipeg, 24; Minnedosa, 4, 5, 25; Qu'Appelle, 4, 9, 24; Medicine Hat, 12, 13; Swift Current, 1; Banff, 1; Battleford, 10; Hamilton, Bermuda, 11, 15.

Auroras.—Auroras were reported as follows; Grand Manan, 10; Quebec, 10; Port Arthur, 11; Winnipeg, 11; Qu'Appelle, 10; Swift Current, 10; Battleford, 11, 12.

DESCRIPTION OF TABLES AND CHARTS.

By ALFRED J. HENRY, Professor of Meteorology.

Table I gives, for about 145 Weather Bureau stations making two observations daily and for about 25 others making only one observation, the data ordinarily needed for climatological studies, viz, the monthly mean pressure, the monthly means and extremes of temperature, the average conditions as to moisture, cloudiness, movement of the wind, and the departures from normals in the case of pressure, temperature, and precipitation, the total depth of snowfall, and the mean wet-bulb temperatures. The altitudes of the instruments above ground are also given.

Table II gives, for about 2,700 stations occupied by voluntary observers, the highest maximum and the lowest minimum temperatures, the mean temperature deduced from the average of all the daily maxima and minima, or other readings, as indicated by the numeral following the name of the station; the total monthly precipitation, and the total depth in inches of any snow that may have fallen. When the spaces in the snow column are left blank it indicates that no snow has fallen, but when it is possible that there may have been snow of which no record has been made, that fact is indicated by leaders, thus (....).

Table III gives, for all stations that make observations at 8 a. m. and 8 p. m., the four component directions and the resultant directions based on these two observations only and without considering the velocity of the wind The total movement for the whole month, as read from the dial of the Robinson anemometer, is given for each station in Table I. By adding the four components for the stations comprised in any geographical division the average resultant direction for that division can be obtained.

Table IV gives the total number of stations in each State from which meteorological reports of any kind have been received, and the number of such stations reporting thunderstorms (T) and auroras (A) on each day of the current month.

Table V gives a record of rains whose intensity at some period of the storm's continuance equaled or exceeded the following rates:

Duration, minutes..	5	10	15	20	25	30	35	40	45	50	60	80	100	120
Rates pr. hr. (ins.)..	3.00	1.80	1.40	1.20	1.08	1.00	0.94	0.90	0.86	0.84	0.75	0.60	0.54	0.50

In the northern part of the United States, especially in the colder months of the year, rains of the intensities shown in the above table seldom occur. In all cases where no storm of sufficient intensity to entitle it to a place in the full table has occurred, the greatest rainfall of any single storm has been given, also the greatest hourly fall during that storm.

Table VI gives, for about 30 stations furnished by the Canadian Meteorological Service, Prof. R. F. Stupart, director, the means of pressure and temperature, total precipitation and depth of snowfall, and the respective departures from normal values, except in the case of snowfall.

Table VII gives the heights of rivers referred to zeros of gages.

NOTES EXPLANATORY OF THE CHARTS.

Chart I, tracks of centers of high areas, and Chart II, tracks of centers of low areas, are constructed in the same way. The roman numerals show number and chronological order of highs (Chart I) and lows (Chart II). The figures within the circles show the days of the month; the letters *a* and *p* indicate, respectively, the 8 a. m. and 8 p. m., seventy-fifth meridian time, observations. Within each circle is also given (Chart I) the highest barometric reading and (Chart II) the lowest pressure at or near the center at that time.

Chart III.—Total precipitation. The scale of shades showing the depth of rainfall is given on the chart itself. For isolated stations the rainfall is given in inches and tenths, when appreciable; otherwise, a "trace" is indicated by a capital T, and no rain at all, by 0.0.

Chart IV.—Sea-level pressure, temperature, and resultant surface winds. The wind directions on this Chart are the computed resultants of observations at 8 a. m. and 8 p. m., daily; the resultant duration is shown by figures attached to each arrow. The temperatures are the means of daily maxima and minima and are reduced to sea level. The pressures are the means of 8 a. m. and 8 p. m. observations, daily, and are reduced to sea level and to standard gravity. The reduction for 30 inches of the mercurial barometer, as formerly shown by the marginal figures for each degree of latitude, has already been applied.

Chart V.—Hydrographs for seven principal rivers of the United States.

Chart VI.—Surface temperatures; maximum, minimum, and mean. Lines of equal monthly mean temperature in red; lines of equal maximum temperature in black; and lines of equal minimum temperature (dotted) also in black.

Chart VII.—Percentage of sunshine. The average cloudiness at each Weather Bureau station is determined by numerous personal observations during the day. The difference between the observed cloudiness and 100, it is assumed, represents the percentage of sunshine, and the values thus obtained have been used in preparing Chart VII.

Chart VIII.—West Indian monthly isobars, isotherms, and resultant winds.

Chart IX.—Total snowfall.

Chart X.—Annual normal surface isobars and wind and cloud directions in arctic regions.

TABLE I.—*Climatological data for Weather Bureau Stations, September*, 1901.

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.									Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.				Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Mean actual, 8 a. m. + 8 p. m. ÷ 2.	Mean reduced.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.				Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					
New England.							62.4	+ 1.7										82	3.06	— 0.1									4.5	
Eastport	76	69	74	29.94	30.03	.00	57.4	+ 1.6	82	5	65	37	26	50	29	53	50	81	2.92	— 0.3	11	6,020	sw.	28	n.	8	13	8	9	5.4	
Portland, Me.	103	81	117	29.92	30.02	— .03	61.8	+ 2.1	86	7	70	39	26	54	31	56	53	79	2.18	— 0.9	13	5,872	sw.	30	se.	17	16	2	12	4.7	
Northfield	876	15	65	29.14	30.07	.00	57.1	+ 1.1	86	7	70	24	26	45	39	52	50	86	1.79	— 1.0	10	4,774	s.	35	sw.	16	13	6	11	5.1	
Boston	125	115	181	29 94	30.06	.00	65.4	+ 3.0	89	5	74	44	26	57	30	60	57	79	2.50	— 0.4	10	6,539	sw.	29	nw.	24	15	4	11	4.4	
Nantucket	12	43	85	30.06	30.07	— .01	65.0	+ 2.3	82	6	70	49	26	60	18	61	59	84	2.11	— 1.2	11	9,036	s.	47	n.	24	10	11	9	5.1	
Block Island	26	11	70	30.04	30.07	.00	64.6	+ 1.0	81	6	70	44	26	59	20	61	59	84	4.07	+ 1.2	11	9,659	sw.	47	ne.	25	15	9	6	3.7	
Narragansett	.....	10	....	....	.....	.....	63.9	+ 1.7	82	6	72	41	*	56	37	....	....	....	3.17	0.0	11	.....	s.	....	.....	...	30	3	7	....	
New Haven	106	117	140	29.96	30.07	— .01	64.3	+ 0.8	87	6	75	41	26	56	37	60	57	80	5.70	+ 2.0	10	5,143	sw.	34	sw.	17	19	3	8	3.3	
Mid. Atlan. States.							65.2	+ 1.2										79	3.20	— 0.6									4.7	
Albany	97	84	113	29.97	30.08	+ .02	65.0	+ 1.9	91	7	74	38	26	56	30	59	56	79	2.96	— 0.5	10	4,272	s.	32	n.	8	15	5	10	4.8	
Binghamton	875	79	90	.....	.....	.....	61.7	+ 0.7	86	6	72	33	26	51	32	....	....	....	3.10	— 0.2	9	3,477	e.	26	w.	12	12	8	10	5.1	
New York	314	108	350	29.74	30.07	— .01	68.4	+ 2.5	87	7	75	49	21	62	23	62	58	74	2.33	— 1.4	12	7,102	nw.	40	w.	17	15	6	9	4.4	
Harrisburg	374	94	104	.....	.....	.....	66.4	+ 2.0	87	7	76	43	20	57	30	....	....	....	2.16	— 1.9	10	3,526	nw.	24	sw.	15	16	5	9	4.3	
Philadelphia	117	168	184	29.96	30.08	— .01	69.5	+ 2.4	90	7	78	48	26	61	23	63	60	77	3.68	+ 0.4	10	6,042	n.	28	w.	15	13	10	7	4.4	
Scranton	805	111	119	29.24	30.09	+ .02	63.2	.....	85	6	74	38	20	53	35	57	54	75	2.35	.....	10	4,035	ne.	24	sw.	16	15	6	9	4.5	
Atlantic City	52	68	76	30.02	30.07	+ .01	68.2	+ 1.5	83	5	74	49	21	62	20	64	61	80	2.33	— 1.2	12	6,772	sw.	30	ne.	25	15	11	4	3.8	
Cape May	17	47	51	30.07	30.09	+ .02	68.6	+ 0.5	84	5	75	46	26	62	20	64	....	....	2.88	— 0.7	13	5,068	ne.	24	ne.	25	11	13	6	4.8	
Baltimore	123	68	82	29 94	30.07	— .01	68.4	+ 0.5	92	15	77	46	26	60	23	63	60	77	2.50	— 1.4	12	3,283	n.	17	w.	13	9	12	9	5.3	
Washington	112	59	76	29.96	30.08	— .01	67.4	— 0.4	92	15	77	43	26	57	30	62	60	83	1.61	— 2.1	11	3,635	nw.	30	nw.	15	11	14	5	4.9	
Cape Henry	.....	5	59	.....	.....	.....	73.6	+ 1.8	94	15	80	58	19	68	21	....	....	....	5.82	+ 1.3	9	9,964	ne.	56	ne.	18	10	14	6	5.3	
Lynchburg	681	83	88	29.34	30.06	— .01	67.8	— 1.2	90	15	77	43	22	58	31	62	60	83	3.17	— 0.6	10	2,248	ne.	22	nw.	15	13	12	5	4.1	
Norfolk	91	102	111	29.97	30.07	.00	72.8	+ 1.7	90	15	79	57	19	67	18	67	65	81	5.80	+ 1.2	9	6,635	ne.	26	n.	19	15	7	8	4.9	
Richmond	144	82	90	.....	.....	.....	70.0	.....	91	16	79	50	21	61	25	....	....	....	3.21	.....	8	3,593	n.	26	w.	15	8	14	8	5.4	
S. Atlantic States.							74.6	+ 0.4										81	5.33	0.0									4.7	
Charlotte	773	68	76	29.25	30.05	— .01	70.2	— 0.9	88	15	79	50	19	61	22	63	60	77	6.43	+ 3.1	7	4,872	ne.	28	nw.	12	16	5	9	4.4	
Hatteras	11	17	36	30.04	30.05	+ .01	75.4	+ 1.7	86	16	79	64	*	72	11	71	69	84	6.56	+ 0.1	8	11,031	ne.	43	n.	19	15	7	8	4.8	
Kittyhawk	8	12	30	.....	.....	.....	74.0	+ 0.6	89	13	78	65	*	70	16	....	....	....	5.63	+ 1.0	7	11,657	ne.	...	.....	...	18	8	4	4.0	
Raleigh	376	93	101	29.68	30.07	.00	71.4	+ 0.9	92	13	80	50	21	62	24	65	63	81	8.26	+ 5.0	8	4,691	n.	23	n.	19	14	10	6	4.5	
Wilmington	78	82	90	29.96	30.04	.00	74.5	+ 0.9	92	13	82	55	22	67	24	69	67	85	5.38	— 1.0	8	6,260	ne.	32	s.	18	7	13	10	5.7	
Charleston	48	14	92	29.98	30.03	.00	77.2	+ 1.2	90	8	84	61	19	71	22	71	69	80	0.40	— 6.2	8	8,130	s.	43	ne.	27	9	14	7	5.1	
Columbia	351	114	122	29.67	30.04	— .01	73.6	— 1.4	92	14	83	53	21	64	25	66	62	75	6.13	+ 2.0	6	5,981	ne.	30	se.	16	16	9	5	4.4	
Augusta	180	89	103	29.84	30.03	— .01	74.4	0.0	92	13	83	56	21	66	25	67	64	77	5.03	+ 1.1	6	4,527	ne.	46	ne.	18	16	8	6	3.9	
Savannah	65	79	89	29.95	30.01	— .02	76.8	+ 1.0	94	13	84	59	21	70	20	70	68	82	2.13	— 4.0	9	5,770	ne.	27	sw.	18	13	10	7	4.6	
Jacksonville	43	69	84	29.94	29.99	.00	78.0	+ 0.4	92	13	84	64	20	72	23	72	71	84	7.38	— 1.0	12	6,365	ne.	32	sw.	17	8	10	12	5.7	
Florida Peninsula.							80.7	+ 0.2										83	7.35	— 0.4									5.9	
Jupiter	28	13	55	29.92	29.94	— .02	80.6	+ 1.0	90	1	86	69	10	75	18	77	75	84	9.71	0.0	16	6,641	se.	49	n.	10	8	17	5	5.5	
Key West	22	43	50	29 91	29.93	— .01	81.4	— 1.1	89	11	86	70	26	77	16	76	74	79	7.15	— 0.3	17	6,080	e.	35	e.	14	6	16	8	5.8	
Tampa	34	60	67	29.92	29.96	— .02	80.2	+ 0.6	94	14	88	68	9	73	20	74	72	85	5.18	— 1.0	15	4,157	ne.	30	s.	27	4	14	12	6.3	
East Gulf States.							75.5	— 0.4										77	5.51	— 0.8									4.5	
Atlanta	1,174	190	216	28.83	30.04	— .03	70.2	— 1.3	88	8	78	49	20	62	22	63	59	76	3.76	0.0	10	7,555	e.	31	s.	16	16	7	7	4.4	
Macon	370	93	99	.....	.....	.....	73.2	.....	92	13	82	54	21	64	27	....	....	....	4.64	.....	8	4,464	ne.	36	s.	16	16	5	9	4.4	
Pensacola	56	78	96	.....	.....	.....	77.8	+ 0.3	90	8	84	60	19	72	18	....	....	....	3.76	— 1.0	7	7,248	ne.	36	se.	16	14	9	7	4.6	
Mobile	57	88	96	29.93	29.99	.00	76.4	— 0.4	92	2	84	54	19	68	23	69	67	79	2.51	— 2.6	9	5,356	n.	31	s.	16	13	10	7	4.8	
Montgomery	223	100	112	29.78	30.01	— .01	74.3	— 1.3	92	9	84	52	19	64	27	65	62	74	5.02	+ 2.1	9	4,564	n.	25	n.	17	16	7	7	4.1	
Meridian	375	84	93	.....	.....	.....	72.2	— 0.8	91	1	82	44	19	62	29	....	....	....	1.90	— 1.5	5	3,554	ne.	25	nw.	12	13	7	10	4.9	
Vicksburg	247	65	76	29.73	29.99	— .03	74.6	— 0.7	92	1	84	46	19	66	26	66	63	75	3.54	0.0	6	4,394	e.	19	w.	14	15	10	5	4.1	
New Orleans	51	88	121	29.92	29.98	+ .01	78.2	— 0.1	92	1	85	55	19	71	19	70	68	79	3.30	— 1.3	7	5,973	ne.	24	ne.	18	13	11	6	4.6	
Port Eads	.....	27	...	29.95	29.96	.....	80.5	+ 0.7	91	2	86	69	*	76	16	76	....	....	4.32	— 1.7	9	.....	e.	....	.....	.....	.....	.....	.....	.....	
West Gulf States.							76.0	— 0.1										73	5.76	+ 1.8									4.2	
Shreveport	349	77	84	29.73	29.99	— .02	74.7	— 0.8	95	1	84	48	19	65	26	67	64	76	3.08	— 0.6	7	4,049	se.	30	ne.	17	16	7	7	4.2	
Fort Smith	457	79	94	29.50	29.98	— .01	73.8	+ 1.5	95	10	86	46	18	62	34	62	56	63	0.42	— 3.1	5	5,516	e.	34	nw.	16	13	15	2	3.3	
Little Rock	357	93	100	29.64	30.01	— .02	72.9	0.0	93	9	83	46	19	63	26	64	59	70	7.07	+ 3.9	8	4,060	ne.	36	s.	24	20	6	4	3.3	
Corpus Christi	18	48	58	29.89	29.91	— .06	79.2	+ 0.4	90	1	85	60	20	74	17	74	72	82	7.15	+ 2.4	15	7,541	e.	25	n.	18	12	13	5	4.2	
Fort Worth	670	106	114	29.25	29.94	— .05	77.4	.....	99	12	88	50	21	67	33	66	60	64	1.67	.....	3	6,998	se.	34	sw.	11	10	17	3	4.6	
Galveston	54	106	112	29.87	29.92	— .04	77.8	— 1.7	88	11	82	58	19	74	15	73	71	83	7.84	+ 1.6	10	8,297	e.	30	se.	13	12	8	10	4.9	
Palestine	510	73	79	29.43	29.97	— .04	74.9	— 0.8	93	1	84	49	19	66	29	66	63	75	10.57	+ 7.3	6	4,328	ne.	24	n.	17	13	11	6	4.2	
San Antonio	701	67	77	29.20	29.93	— .04	78.4	+ 0.9	97	14	88	54	21	68	33	68	65	73	4.20	+ 0.8	10	4,833	se.	30	se.	25	8	13	9	5.1	
Ohio Val. & Tenn.							69.4	— 0.3										76	2.84	— 0.1									4.0	
Chattanooga	762	106	112	29.27	30.07	+ .01	69.4	— 1.3	88	7	78	47	19	60	25	63	60	78	3.77	+ 0.1	8	3,725	ne.	34	nw.	16	17	4	9	4.2	
Knoxville	1,004	10	88	29.01	30.06	— .02	68.1	— 1.2	88	8	78	42	19	58	27	62	60	84	4.13	+ 1.4	6	4,390	n.	30	sw.	15	17	6	7	3.8	
Memphis	397	140	154	29.63	30.05	+ .01	72.4	+ 0.3	91	8	80	46	19	64	24	65	61	74	5.56	+ 2.4	5	5,900	ne.	35	s.	12	19	7	4	3.3	
Nashville	546	128	134	29.49	30.07	+ .03	70.0	— 0.7	91	8	79	44	19	60	28	63	59	76	4.27	+ 0.2	7	3,729	ne.	28	s.	10	19	5	6	3.3	
Lexington	989	75	102	.....	.....	.....	67.0	— 1.1	89	8	76	40	19	58	25	....	....	....	2.18	— 0.4	7	5,482	se.	26	nw.	12	13	15	2	4.2	
Louisville	525	114	136	29.50	30.06	.00	70.0	+ 0.6	93	9	80	42	19	59	30	61	56	70	2.78	0.0	9	4,670	n.	29	nw.	12	17	11	2	3.5	
Evansville	434	72	82	.....	.....	.....	70.8	.....	95	8	82	42	18	60	27	....	....	....	1.82	.....	8	4,063	ne.	35	sw.	11	23	6	1	1.9	
Indianapolis	822	154	164	29.19	30.05	.00	67.4	+ 1.4	91	7	78	39	19	57	27	58	53	65	0.66	— 2.3	6	6,235	se.	44	sw.	12	14	14	2	3.6	
Cincinnati	698	152	157	29.40	30.06	+ .01	68.6	+ 0.5	91	7	78	43	19	59	26	60	56	70	0.92	— 1.5	5	4,350	se.	26	w.	12	14	9	7	4.2	
Columbus	824	87	100	29.20	30.07	+ .03	66.6	+ 0.5	90	7	76	40	19	57	29	58	54	72	2.10	— 0.5	8	4,673	e.	21	sw.	12	14	10	6	4.3	
Pittsburg	842	116	123	29.18	30.06	— .01	66.5	— 0.2	87	7	75	45	21	58	29	59	56	75	1.96	— 0.6	8	3,504	nw.	20	nw.	16	13	10	7	4.7	
Parkersburg	638	77	84	29.42	30.10	+ .02	65.9	— 2.3	88	7	76	40	19	56	33	59	57	79	2.96	— 0.2	12	2,806	s.	32	nw.	11	9	9	12	5.5	
Elkins	1,940	41	50	28.07	30.10	+ .02	61.8	.....	84	7	74	32	20	50	38	55	54	90	3.14	.....	8	2,360	se.	19	w.	10	8	14	8	5.5	
Lower Lake Region.							64.2	+ 1.0										74	2.92	0.0									4.6	
Buffalo	767	178	206	29.24	30.05	+ .01	64.2	+ 2.1	80	6	71	42	19	58	28	58	54	73	3.29	0.0	9	9,182	sw.	53	sw.	16	10	10	10	6.3	
Oswego	335	76	87	29.69	30.05	— .01	62.0	+ 0.3	82	7	69	39	20	55	26	57	53	76	3.13	+ 0.3	7	6,307	s.	36	ne.	7	14	6	10	4.6	
Rochester	523	81	90	29.50	30.06	+ .02	63.2	+ 1.2	87	7	72	40	20	54	31	57	54	77	3.08	+ 0.7	9	5,162	sw.	37	sw.	16	17	12	1	3.6	
Erie	713	92	102	29.29	30.05	.00	64.2	+ 0.6	83	6	71	44	19	57	32	58	54	76	2.99	— 1.0	10	7,160	s.	31	s.	27	12	7	11	5.4	
Cleveland	762	190	201	29.25	30.05	— .01	64.1	+ 0.3	80	7	71	46	19	57	24	58	54	76	7.38	+ 3.9	10	9,076	se.	36	sw.	10	13	6	11	4.6	
Sandusky	629	62	70	29.39	30.05	.00	65.8	+ 0.7	88	7	74	44	18	58	28	59	55	73	1.01	— 1.8	11	5,218	w.	30	nw.	12	11	11	8	4.2	
Toledo	628	123	127	29.39	30.06	+ .02	65.0	+ 1.1	89	7	74	39	19	56	27	57	53	72	0.87	— 1.5	7	6,423	w.	32	w.	16	15	10	5	3.6	
Detroit	730	160	190	29.27	30.04	— .01	64.8	+ 1.9	88	7	73	40	19	57	26	57	53	73	1.65	— 0.8	7	7,806	sw.	38	sw.	15	13	13	4	4.1	
Upper Lake Region.							59.8	+ 0.8										78	2.86	— 0.6									5.6	
Alpena	609	63	80	29.38	30.04	+ .03	58.8	+ 1.6	90	6	67	35	19	50	31	53	50	78	3.36	— 0.4	10	7,163	nw.	42	w.	16	8	11	11	5.5	
Escanaba	612	43	57	29.36	30.01	+ .01	56.7	0.0	82	2	65	34	30	49	28	53	50	82	2.15	— 1.4	12	6,617	s.	30	sw.	16	8	8	14	6.3	
Grand Haven	632	55	92	29.35	30.02	.00	61.0	+ 0.1	85	6	69	40	19	54	26	56	53	80	2.98	— 0.6	12	7,990	sw.	37	sw.	16	13	9	8	4.5	
Houghton	668	66	74	.....	.....	.....	56.8	.....	88	5	66	34	19	47	30	....	....	....	2.00	... ...	10	5,043	w.	31	w.	16	8	10	12	5.8	
Marquette	734	79	116	29.22	30.00	+ .01	57.5	+ 0.7	86	4	64	37	18	51	23	53	50	79	4.44	+ 0.6	14	8,231	sw.	43	s.	22	6	7	17	6.6	T.
Port Huron	638	70	120	29.39	30.07	+ .04	62.8	+ 1.6	90	7	72	35	19	54	31	57	54	78	2.13	— 0.5	7	8,138	sw.	37	sw.	15	11	12	7	4.6	
Sault Ste. Marie	614	40	61	29.35	30.00	— .01	57.0	+ 1.5	85	6	66	35	19	48	30	51	48	78	2.31	— 2.2	9	5,287	e.	45	sw.	15	8	11	11	5.9	
Chicago	823	241	274	29.16	30.03	.00	64.3	+ 0.1	87	5	71	40	18	58	26	58	54	75	2.92	+ 0.1	6	11,882	s.	48	w.	15	17	5	8	4.0	
Milwaukee	681	124	142	29.31	30.03	.00	62.8	+ 1.6	88	5	70	38	18	55	28	57	55	83	1.86	— 1.0	8	7,857	sw.	37	s.	22	11	8	11	5.5	
Green Bay	617	49	57	29.36	30.02	— .02	60.2	— 0.3	91	6	69	35	18	51	31	53	50	74	4.15	+ 1.1	14	5,960	s.	34	sw.	16	7	6	17	6.7	
Duluth	702	95	115	29.23	29.98	.00	57.4	+ 1.2	86	4	64	37	18	51	29	51	46	73	2.30	— 1.6	6	7,413	ne.	40	ne.	24	11	6	13	5.7	
North Dakota.							53.9	— 2.4										76	2.06	+ 0.7									5.9	
Moorhead	935	54	60	28.95	29.96	.00	55.6	— 0.9	90	3	67	28	18	44	40	49	45	76	2 94	+ 0.8	6	7,360	se.	45	se.	25	11	8	11	5.6	
Bismarck	1,674	16	29	28.19	29.97	+ .02	54.7	— 2.3	95	3	65	22	18	44	45	48	44	74	1.47	+ 0.3	10	7,648	nw.	35	nw.	15	8	13	9	5.7	
Williston	1,875	15	31	27.96	29.95	.00	51.4	— 4.1	99	2	62	27	26	40	40	46	44	78	1.77	+ 1.0	16	7,176	nw.	48	nw.	15	6	13	11	6.3	

TABLE I.—*Climatological data for Weather Bureau Stations, September*, 1901—Continued.

Stations.	Elevation of instruments: Barometer above sea level, feet.	Elevation of instruments: Thermometers above ground.	Elevation of instruments: Anemometer above ground.	Pressure, in inches: Mean actual, 8 a. m. + 8 p. m. + 2.	Pressure, in inches: Mean reduced.	Pressure, in inches: Departure from normal.	Temperature of the air, in degrees Fahrenheit: Mean max. + mean min. ÷ 2.	Temperature: Departure from normal.	Temperature: Maximum.	Temperature: Date.	Temperature: Mean maximum.	Temperature: Minimum.	Temperature: Date.	Temperature: Mean minimum.	Temperature: Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches: Total.	Precipitation: Departure from normal.	Precipitation: Days with .01, or more.	Wind: Total movement, miles.	Wind: Prevailing direction.	Wind: Maximum velocity: Miles per hour.	Wind: Maximum velocity: Direction.	Wind: Maximum velocity: Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
Upper Mis. Valley.							65.4	+ 0.5										70	3.22	0.0										4.4	
Minneapolis	.....	99	208	.....	.....	.....	60.0	— 2.2	90	5	69	36	18	51	29	...	...	...	3.80	+ 1.3	12	9,012	w.	38	w.	16	7	8	15	....	
St. Paul	837	114	124	29.07	29.97	— .02	59.7	— 0.1	90	5	68	36	20	51	31	52	48	72	5.04	+ 2.0	14	5,552	s.	34	nw.	16	10	9	11	5.5	
La Crosse	714	70	78	.....	.....	.....	60.4	— 1.2	91	6	70	36	18	51	38	...	...	...	9.84	+ 5.6	13	4,699	s.	28	w.	15	9	9	12	5.7	
Davenport	606	71	79	29.36	30.00	— .03	65.4	+ 0.7	93	6	75	36	18	56	32	57	52	70	2.29	— 0.9	8	5,189	s.	29	w.	15	16	3	11	4.3	
Des Moines	861	84	88	29.09	30.01	+ .01	64.8	+ 0.7	93	6	75	36	18	54	36	57	53	73	2.60	— 0.6	8	5,789	s.	32	sw.	22	9	12	9	5.5	
Dubuque	698	101	109	29.26	30.01	+ .01	62.8	— 0.4	91	6	72	38	18	54	29	55	51	71	3.72	— 0.4	12	5,172	se.	32	se.	22	11	6	13	5.4	
Keokuk	614	63	78	29.35	30.00	+ .02	67.4	+ 1.0	95	7	78	35	18	57	34	58	53	70	2.14	— 1.4	6	4,933	se.	28	nw.	12	17	9	4	3.3	
Cairo	356	87	93	29.67	30.05	+ .02	70.9	+ 1.0	92	8	80	42	18	62	26	63	60	76	1.56	— 1.0	5	4,210	s.	32	n.	16	21	5	4	2.9	
Springfield, Ill.	644	82	93	29.36	30.03	+ .01	67.4	+ 1.0	94	7	79	35	18	56	33	58	53	68	1.95	— 1.2	8	5,626	s.	32	nw.	12	12	10	8	4.8	
Hannibal	534	75	110	.....	.....	.....	68.8	+ 2.1	93	7	80	36	18	58	35	...	...	...	1.83	— 0.7	5	5,675	s.	32	w.	14	15	11	4	3.8	
St. Louis	567	111	210	29.43	30.03	.00	71.8	+ 2.4	95	9	82	43	18	62	30	61	55	64	0.64	— 2.5	4	4,598	s.	45	sw.	11	20	4	6	3.1	
Missouri Valley.							64.5	— 0.7										68	4.66	+ 2.3										4.5	
Columbia	784	4	84	.....	.....	.....	69.4	— 0.1	98	6	83	32	18	56	41	...	...	...	1.37	— 2.2	7	4,974	se.	24	nw.	12	16	10	4	3.6	
Kansas City	963	78	95	29.00	30.00	.00	68.8	+ 1.3	94	7	78	38	18	59	31	59	53	64	1.84	— 1.6	9	5,321	s.	30	s.	22	14	7	9	4.4	
Springfield, Mo	1,324	100	103	28.63	30.00	— .01	69.5	+ 1.8	90	7	80	39	18	59	30	59	53	64	1.79	— 2.3	6	6,729	se.	29	nw.	9	14	10	6	3.7	
Topeka	.....	81	....	.....	.....	.....	68.4	— 0.3	98	7	79	38	20	58	34	...	...	...	6.02	+ 3.3	13	.....	s.	.....	.....	...	10	16	4	4.2	T.
Lincoln	1,189	75	84	28.69	29.94	— .06	65.2	— 0.9	93	5	77	31	18	54	38	57	52	71	6.00	+ 4.1	13	7,717	se.	48	nw.	11	13	12	5	4.1	
Omaha	1,105	115	121	28.79	29.94	— .06	65.4	+ 0.6	92	5	76	32	18	55	32	56	51	68	6.83	+ 3.9	13	5,492	se.	26	sw.	26	8	12	10	5.6	
Valentine	2,598	39	40	27.22	29.91	— .09	59.6	— 2.0	92	21	71	26	18	48	45	51	46	70	4.06	+ 3.1	8	8,113	nw.	36	s.	24	14	12	4	4.2	
Sioux City	1,135	96	164	.....	.....	.....	62.3	— 2.9	91	5	72	30	18	52	32	...	...	...	7.99	+ 6.8	14	9,404	se	50	se.	11	16	7	7	4.4	
Pierre	1,572	43	50	28.27	29.93	— .06	60.3	— 3.4	91	3	71	26	18	49	32	51	45	65	1.30	+ 0.2	13	4,731	se.	36	nw.	15	9	12	9	5.3	
Huron	1,306	56	67	28.56	29.96	— .04	58.6	— 1.5	90	3	70	29	18	48	38	51	47	75	6.75	+ 5.3	12	8,931	se.	47	se.	24	7	15	8	5.5	
Yankton	1,233	52	58	.....	.....	.....	62.2	+ 0.1	92	22	72	30	18	52	34	....	....	....	7.44	+ 4.6	9	6,806	e.	40	se.	24	12	12	6	4.4	
Northern Slope.							55.1	— 3.0										68	1.63	+ 0.7										5.2	
Havre	2,505	46	47	27.32	29.95	— .01	50.5	— 4.4	89	1	60	28	19	41	46	45	41	75	2.04	+ 0.9	12	6,332	ne.	46	nw.	15	3	18	9	6.3	2.4
Miles City	2,371	42	50	27.43	29.90	— .08	56.2	— 3.8	96	2	66	32	17	46	36	52	50	88	1.39	+ 0.6	6	5,432	nw.	30	se.	11	7	13	10	5.6	
Helena	4,110	88	93	25.78	29.97	— .02	49.6	— 6.2	85	1	58	32	6	41	31	42	36	64	2.63	+ 1.5	15	5,228	sw.	36	ne.	1	2	9	19	7.3	1.0
Kalispell	2,965	45	51	26.90	29.99	+ .02	49.1	.....	83	1	59	30	30	39	35	43	39	74	1.81	.....	18	3,744	w.	28	nw.	14	7	12	11	5.7	
Rapid City	3,234	46	50	26.57	29.88	— .08	57.0	— 4.4	88	2	68	27	18	46	46	48	41	64	1.30	+ 0.7	11	5,933	se.	46	se.	3	15	7	8	4.3	
Cheyenne	6,088	56	64	24.01	29.91	— .04	56.4	+ 0.2	82	1	71	30	29	42	48	43	33	51	0.75	— 0.1	5	6,906	s.	46	w	24	18	9	3	3.5	
Lander	5,372	26	36	24.61	29.94	— .03	53.7	— 2.1	85	2	70	28	17	37	50	43	34	54	0.13	— 0.6	3	3,118	sw.	30	ne.	18	13	15	2	3.8	
North Platte	2,821	43	52	27.05	29.95	— .03	62.2	— 0.2	88	24	74	31	18	51	40	55	52	76	3.14	+ 1.9	7	6,706	se.	40	s.	24	12	13	5	4.8	
Middle Slope.							63.0	+ 0.2										62	1.58	— 0.2										4.0	
Denver	5,291	79	151	24.71	29.91	— .03	62.7	+ 0.8	89	2	78	33	18	47	52	48	38	51	0.22	— 0.6	2	5,501	sw.	50	nw.	24	21	8	1	2.5	
Pueblo	4,685	80	86	25.25	29.87	— .06	64.2	— 1.0	88	22	80	33	20	48	55	50	38	48	0.40	0.0	4	4,701	se.	50	n.	19	21	8	1	3.1	
Concordia	1,398	42	47	28.49	29.95	— .03	67.4	— 0.4	92	6	78	34	20	57	37	59	54	71	2.58	+ 0.2	12	5,946	s.	31	s.	24	12	12	6	4.7	
Dodge	2,509	44	52	27.36	29.91	— .04	69.6	+ 2.0	95	22	82	35	20	57	40	58	58	66	2.54	+ 1.2	8	9,868	se.	42	se.	24	12	14	4	4.1	
Wichita	1,358	78	85	28.56	29.96	— .01	70.4	+ 0.4	93	10	81	36	20	60	37	60	55	67	3.04	+ 0.4	9	6,066	s.	28	s.	22	14	9	7	4.4	
Oklahoma	1,214	54	62	28.69	29.95	— .02	73.5	— 0.3	92	12	84	41	20	63	33	63	57	66	0.67	— 2.2	3	7,312	se.	32	n.	16	9	12	9	5.0	
Southern Slope.							72.0	+ 1.0										65	2.00	— 0.2										4.4	
Abilene	1,738	45	54	28.14	29.92	— .06	76.4	+ 1.8	96	14	86	52	20	66	32	64	58	62	1.81	— 0.6	6	6,147	se.	29	ne.	5	12	9	9	4.9	
Amarillo	3,676	54	61	26.24	29.92	— .05	67.7	+ 0.3	88	21	78	42	20	57	36	58	52	68	2.19	— 0.1	8	12,332	se.	44	sw.	24	13	11	6	4.0	
Southern Plateau.							71.0	— 0.1										37	0.50	— 0.2										1.3	
El Paso	3,762	10	110	26.12	29.84	— .05	76.2	+ 3.1	96	16	89	55	29	63	36	59	48	46	0.82	— 0.3	5	7,017	e.	38	nw.	30	20	7	3	2.8	
Santa Fe	7,013	47	50	23.30	29.92	— .04	61.2	+ 1.3	81	15	72	38	17	50	34	47	37	49	2.00	+ 0.5	10	4,666	se.	37	n.	8	23	5	2	2.1	
Flagstaff	6,907	12	25	23.35	29.99	.....	56.7	— 1.7	83	16	75	24	25	39	51	44	...	....	0.15	— 0.8	1	.....	sw.	....	.....	...	21	8	1	1.9	
Phoenix	1,108	47	57	28.61	29.74	— .08	82.4	+ 1.6	105	1	98	53	25	66	41	59	42	28	T.	— 0.5	0	2,942	e.	17	w.	23	28	2	0	0.6	
Yuma	141	16	50	29.56	29.70	— .08	81.6	— 3.1	106	17	98	52	26	65	44	63	50	43	0.00	— 0.2	0	3,719	w.	23	s.	30	30	0	0	0.0	
Independence	3,910	51	58	25.87	29.74	— .11	68.0	— 2.0	92	15	82	40	24	55	33	48	24	21	0.00	— 0.1	0	5,501	s.	48	w.	23	28	2	0	0.6	
Middle Plateau.							60.9	— 1.8										34	0.31	— 0.3										1.6	
Carson City	4,720	82	92	25.20	29.89	— .02	58.4	— 1.1	89	18	74	33	25	43	46	46	35	48	0.40	+ 0.1	3	4,966	sw.	34	sw.	21	27	2	1	1.1	T.
Winnemucca	4,344	59	70	25.53	29.85	— .08	55.2	— 4.9	89	19	72	27	27	38	49	43	29	39	0.19	— 0.1	3	5,977	ne.	48	sw.	21	19	6	5	2.8	
Modena	5,479	10	38	24.55	29.93	.....	59.0	.....	87	15	78	28	25	40	47	40	19	26	0.06	.....	2	8,418	w.	60	sw.	23	30	0	0	0.2	
Salt Lake City	4,366	105	110	25.54	29.87	— .07	63.0	— 1.3	86	19	75	39	24	51	36	46	28	30	0.66	— 0.3	1	5,020	se.	40	sw.	23	21	6	3	2.5	
Grand Junction	4,608	43	51	25.29	29.83	— .09	67.0	+ 0.3	91	2	83	38	26	51	44	47	28	26	T.	— 0.9	0	4,070	se.	36	sw.	24	26	3	1	1.4	
Northern Plateau.							56.3	— 3.5										58	1.24	+ 0.5										5.1	
Baker City	3,471	53	58	26.39	29.96	— .02	52.3	— 3.5	81	20	63	32	23	42	34	43	35	58	1.16	+ 0.4	10	4,078	nw.	24	sw.	21	11	7	12	5.3	
Boise	2,739	61	68	27.09	29.92	— .06	58.2	— 2.6	88	19	72	36	7	45	38	47	36	50	0.37	— 0.1	5	2,814	nw.	24	sw.	1	15	9	6	4.1	
Lewiston	757	32	61	.....	.....	.....	60.6	.....	86	19	72	42	30	50	38	.....	.....	...	1.62	.....	12	2,264	e.	26	nw.	13	10	10	10	5.3	
Pocatello	4,482	46	54	25.41	29.89	— .09	57.3	— 3.2	84	1	71	33	16	44	43	45	34	46	0.71	0.0	4	6,853	w.	34	w.	13	14	11	5	4.2	
Spokane	1,943	99	107	27.93	29.97	— .01	55.0	— 3.1	76	19	65	33	30	45	34	47	40	63	2.07	+ 1.1	13	3,633	s.	26	ne.	5	7	6	17	7.1	
Walla Walla	1,000	65	73	28.88	29.95	— .05	58.8	— 5.1	82	18	69	39	23	49	32	53	48	71	1.88	+ 1.0	11	3,620	s.	30	sw.	21	12	13	5	4.4	
N. Pac. Coast Reg.							56.1	— 1.5										76	3.00	— 0.1										5.0	
Neah Bay	50	7	50	29.92	29.98	— .03	53.2	— 2.0	74	18	59	40	30	48	27	51	48	86	3.13	— 4.2	11	5,042	e.	27	e.	18	13	5	12	5.0	
Port Crescent	259	14	20	.....	.....	.....	51.6	— 1.2	73	18	61	34	30	42	32	.....	.....	....	1.03	— 2.4	9	2,478	e.	14	w.	1	12	11	7	4.4	
Seattle	123	114	121	29.87	30.00	— .04	58.0	+ 0.8	86	19	66	42	8	50	32	52	48	73	2.30	+ 0.5	10	3,246	se.	29	sw.	21	12	7	11	5.1	
Tacoma	213	113	120	.....	.....	.....	56.0	— 0.2	84	19	64	40	30	48	34	.....	.....	....	2.42	+ 0.2	12	3,680	n.	28	n.	29	9	11	10	5.2	
Astoria	30	57	64	.....	.....	.....	56.7	— 2.5	81	18	63	45	14	50	28	.....	.....	....	4.71	+ 0.4	12	.....	nw.	.....	.....	...	11	8	11	5.2	
Portland, Oreg	154	203	213	29.81	29.97	— .06	58.3	— 2.4	85	18	67	41	14	50	29	53	49	75	3.57	+ 1.8	13	6,111	nw.	42	s.	21	10	8	12	5.6	
Roseburg	518	56	67	29.40	29.96	— .07	59.0	— 1.9	87	18	70	39	8	48	42	52	46	70	3.81	+ 2.7	14	2,508	nw.	30	sw.	21	13	8	9	4.5	
Mid. Pac. C'st Reg.							61.5	— 1.7										64	1.91	+ 1.2										3.6	
Eureka	62	60	69	29.88	29.94	— .05	55.5	+ 0.1	65	24	60	44	6	51	17	52	50	83	4.26	+ 3.0	9	3,955	sw.	31	nw.	2	7	17	6	4.5	
Mount Tamalpais	2,375	11	18	27.46	29.90	— .04	62.8	.....	87	14	70	43	24	56	27	50	40	53	1.21	.....	7	11,723	nw.	69	nw.	29	23	2	5	2.2	
Red Bluff	332	50	56	29.49	29.84	— .06	71.2	— 2.6	103	16	84	45	24	58	38	56	42	45	1.84	+ 1.2	6	4,033	se.	25	n.	2	20	3	7	2.7	
Sacramento	69	106	117	29.77	29.84	— .06	67.6	— 1.0	98	15	81	48	24	54	38	56	48	58	0.56	+ 0.2	1	5,726	s.	28	sw.	6	23	2	3	1.6	
San Francisco	155	161	167	29.75	29.91	— .02	58.5	— 1.9	78	3	64	50	17	53	24	54	52	84	0.78	+ 0.5	3	7,922	sw.	36	sw.	15	16	6	8	3.8	
Point Reyes Light	.....	12	16	.....	.....	.....	54.6	— 2.0	82	3	60	46	7	49	32	....	....	....	2.11	+ 1.2	6	9,686	nw.	52	nw.	1	6	6	18	6.5	
S. Pac. Coast Reg.							65.7	— 2.6										68	0.20	+ 0.1										2.5	
Fresno	330	67	70	29.48	29.83	— .03	70.6	— 3.9	100	15	86	45	25	55	39	56	43	45	0.59	+ 0.4	3	4,026	nw.	26	nw.	29	27	1	2	0.9	
Los Angeles	338	74	82	29.51	29.86	— .02	64.6	— 3.9	84	13	76	46	27	53	34	56	53	78	0.03	0.0	2	3,108	w.	15	w.	23	13	15	2	3.7	
San Diego	87	94	102	29.77	29.87	— .02	64.8	— 2.2	72	25	69	56	25	61	16	60	57	79	0.06	0.0	1	4,061	nw.	19	nw.	19	24	5	1	2.5	
San Luis Obispo	201	10	46	29.70	29.92	+ .01	62.9	— 0.5	94	13	76	43	20	50	42	55	50	70	0.10	0.0	1	3,429	w.	21	n.	12	22	5	3	2.8	
West Indies.																															
Basseterre	29	41	54	29.91	29.94	.....	81.3	.....	89	3	87	72	19	76	14	76	74	79	8.28	.....	20	5,968	ne.	47	se.	11	14	12	4	4.4	
Bridgetown	30	57	65	29.89	29.92	.....	81.2	+ 2.5	90	25	87	70	29	75	15	77	75	80	9.37	+ 2.5	18	5,058	e.	36	sw.	30	11	7	12	5.7	
Cienfuegos	52	62	67	29.85	29.90	.....	79.6	.....	92	13	86	69	27	73	22	74	73	88	14.14	.....	23	4,592	ne.	32	sw.	9	7	16	7	5.6	
Grand Turk	11	6	20	.....	.....	.....	84.0	.....	94	25	90	73	15	78	19	.....	.....	...	0.95	.....	11	.....	se.	.....	.....	...	0	19	11	6.3	
Havana	57	87	105	29.85	29.91	.....	80.4	— 0.3	91	17	87	72	27	74	18	76	76	90	4.98	— 1.7	19	7,284	e.	48	se.	15	3	19	8	6.4	
Kingston	286	38	52	29.59	29.89	.....	78.8	.....	90	11	86	70	24	72	18	74	72	83	8.67	.....	17	4,236	ne.	27	se.	6	4	12	14	6.8	
Port of Spain	40	65	66	29.87	29.91	.....	80.8	.....	91	5	88	72	23	74	19	75	73	80	6.63	.....	18	2,702	e.	17	se.	22	3	11	16	7.1	
Puerto Principe	352	55	62	29.57	29.91	.....	80.0	.....	93	10	88	69	14	72	21	74	73	89	8.59	.....	21	4,512	ne.	36	e.	14	5	13	12	6.2	
Roseau	25	37	47	29.90	29.92	.....	81.2	.....	91	12	87	72	18	75	15	75	72	75	5.24	.....	14	3,448	e.	27	w.	18	10	10	10	5.5	
San Juan	82	48	90	29.86	29.94	.....	81.3	.....	92	6	87	71	25	75	17	76	74	81	7.39	+ 2.3	19	7,112	se.	52	se.	12	7	9	14	6.3	
Santiago de Cuba	82	46	52	29.82	29.90	.....	80.5	.....	94	9	88	68	28	73	20	75	73	83	11.10	.....	13	2,960	n.	54	se.	13	5	17	8	5.9	
Santo Domingo	57	37	44	29.88	29.94	.....	79.6	.....	91	11	86	69	12	73	18	76	74	87	11.20	.....	16	3,957	n.	47	se.	12	7	15	8	5.5	
Willemstad	75	39	46	29.79	29.86	.....	83.0	.....	90	29	88	74	17	78	14	77	75	78	2.24	.....	10	7,058	e.	22	e.	7	6	22	2	4.7	

TABLE II.—*Climatological record of voluntary and other cooperating observers, September, 1901.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	*Ins.*	*Ins.*
Ashville	89	43	69.0	3.81	
Benton	.....	.....	.....	5.37	
Bermuda	95	51	75.2	4.28	
Birmingham	91	42	72.2	5.59	
Bridgeport	.....	.....	.....	4.21	
Burkville	.....	.....	.....	3.95	
Calera	.....	.....	.....	7.33	
Camp Hill	93	49	72.9	3.46	
Citronelle	93	50	75.9	3.13	
Clanton	87	48	70.6	2.95	
Cordova	92	50	71.8	7.40	
Daphne	93	52	76.2	3.02	
Decatur	91	40	68.6	6.80	
Demopolis	.....	.....	.....	4.54	
Eufaula[a]	92	51	73.7	11.45	
Eutaw	94	46	74.4	2.94	
Evergreen	92	53	74.6	3.25	
Flomaton	91	54	74.8	3.87	
Florence[a]	.....	.....	.....	6.56	
Florence[b]	93[r]	40[r]	70.8[r]	6.50	
Fort Deposit	93	50	73.6	2.80	
Gadsden	93	46	72.2	4.20	
Goodwater	91	48	71.0	2.67	
Greensboro	92	45	72.2	4.02	
Greenville	.....	.....	.....	4.10	
Hamilton	92	.....	.....	4.28	
Healing Springs	93	48	73.8	2.29	
Highland Home	91	50	73.4	2.81	
Letohatchee	.....	.....	.....	3.60	
Livingston[a]	95	44	73.0	1.10	
Lock No. 4	94	46	71.3	5.08	
Madison	92	41	70.0	9.21	
Maplegrove	93	41	69.3	4.23	
Marion	93	47	74.8	3.00	
Mount Willing	94	52	73.8	2.95	
Newbern	91	44	74.1	4.03	
Newburg	.....	.....	.....	5.01	
Notasulga	.....	.....	.....	4.17	
Oneonto	86	42	68.0	4.17	
Opelika	89	52	72.0	3.35	
Oxanna	88	46	69.6	3.16	
Prattville[e]	92	51	73.0	.....	
Pushmataha	92	46	72.4	2.79	
Riverton	92	39	69.8	3.97	
Scottsboro	86	44	68.4	6.09	
Selma	92	49	73.6	3.95	
Talladega	93	46	71.9	3.66	
Tallassee	.....	.....	.....	3.85	
Thomasville	94	47	75.0	2.56	
Tuscaloosa	94	42	72.2	3.45	
Tuscumbia	90	44	69.9	4.83	
Tuskegee	93	52	74.8	2.07	
Union Springs	91	51	73.3	5.86	
Uniontown	93	44	73.6	4.30	
Valleyhead	90	42	69.5	3.65	
Verbena	.....	.....	.....	3.53	
Wetumpka	93	51	75.1	3.72	
Arizona.					
Allaire Ranch	.....	.....	.....	0.54	
Arizona Canal Co. Dam.	104	55	81.0	0.00	
Aztec[*5]	97	64	85.7	0.00	
Benson[*1]	93	56	78.3	0.12	
Bisbee	89	54	72.6	0.94	
Bowie[*1]	96	62	73.6	1.00	
Buckeye	107	41	77.7	0.00	
Casagrande[*1]	111	65	84.2	0.00	
Champie Camp	110	49	81.1	0.00	
Cochise[*5]	89	65	75.7	0.50	
Congress	98	54	80.4	T.	
Dragoon[*1]	92	59	72.4	0.84	
Dudleyville	104	48	77.3	0.12	
Duncan	99	35	71.6	3.90	
Fort Apache	93	35	64.8	0.45	
Fort Defiance	85	25	58.5	0.35	
Fort Grant	98	54	76.0	1.20	
Fort Huachuca	93	50	73.3	0.74	
Fort Mohave	112	49	81.2	0.00	
Gilabend[*1]	106	60	85.8	0.00	
Globe	99	47	75.4	0.87	
Ingleside[k]	108	49	82.1	0.00	
Jerome	93	52	74.6	0.00	
Kingman	100	39	74.0	0.00	
Maricopa[*1]	103	70	84.2	0.00	
Mesa	104	48	78.8	T	
Mohawk Summit[*1]	114	69	90.4	0.00	
Mount Huachuca	96	50	73.4	3.04	
Natural Bridge	.....	.....	.....	0.20	
Nogales	97	45	75.8	2.03	
Oracle	92	52	75.1	0.15	
Oro	.....	.....	.....	1.08	
Parker	111	47	82.4	T.	
Phoenix	107	47	80.6	0.00	
Pima	102	45	75.6	0.46	
Pinal Ranch	.....	.....	.....	1.62	
Prescott	92[b]	29[b]	61.0[b]	0.00	
St. Johns	94	33	67.2	0.22	
San Carlos	104	44	77.6	1.93	
Sentinel[*1]	109	64	89.2	0.00	
Showlow	.....	.....	.....	0.35	
Signal	111	43	77.2	T.	
Silverking	.....	.....	.....	1.75	
Strawberry	88	30	60.3	0.15	
Supai	111	50	78.6	0.00	
Superstition	.....	.....	.....	0.34	
Taylor	89	30	62.0	0.10	
Tombstone	93	54	74.9	1.23	
Tonto	101[f]	43[f]	75.4[f]	0.12	
Truxton	94	41	70.0	0.00	
Tuba	91	40	68.9	0.00	
Tucson	104	49	79.6	0.28	
Vail[*5]	98	68	82.8	0.07	
Walnut Grove	.....	.....	.....	0.00	
Willcox[*1]	95	54	70.5	0.30	
Yarnell	.....	.....	.....	0.02	
Arkansas.					
Amity	94	41	71.6	5.54	
Arkadelphia	98	39	74.6	3.80	
Arkansas City	.....	.....	.....	2.58	
Batesville	99	37	73.2	1.45	
Beebranch[j]	99	38	73.4	1.55	
Blanchard	92	40	71.3	2.24	
Brinkley	97	39	71.8	5.00	
Camden[a]	.....	.....	.....	4.32	
Camden[b]	92	44	72.8	5.20	
Conway	99	41	75.0	1.86	
Corning	98	33	70.4	0.77	
Dallas	92	42	72.4	5.81	
Dardanelle	.....	.....	.....	1.33	
Dutton[c]	90	38	70.4	.....	
Fayetteville	93	37	70.4	0.50	
Forrest City	95	42	72.6	5.09	
Fulton	.....	.....	.....	2.07	
Hardy	97	37	72.2	0.17	
Helena[a]	.....	.....	.....	4.10	
Helena[b]	93	45	72.3	6.25	
Ione	94	34	73.6	1.07	
Jonesboro	99	45	74.8	2.00	
Keesees Ferry	98	35	71.0	0.32	
Lacrosse[d]	98	36	78.2	.....	
Lonoke	100	39	72.8	4.02	
Lutherville	94	39	71.3	0.98	
Malvern	99	40	73.4	4.08	
Marianna	93	39	70.6	6.55	
Marvell	96	41	72.1	8.87	
Mossville	91	37	70.7	0.41	
Mount Nebo	90	40	73.2	0.35	
New Gascony	98	40	72.8	7.81	
Newport[a]	.....	.....	.....	3.05	
Newport[b]	100	38	72.5	2.78	
Newport[c]	97	37	71.2	3.00	
Oregon	98	34	71.3	0.81	
Osceola	94	38	70.6	2.40	
Ozark	97	45	76.4	0.38	
Pinebluff	101	42	73.4	4.19	
Pocahontas	98	36	70.4	1.36	
Pond	96	32	70.4	2.61	
Prescott	96	44	74.2	3.76	
Rison	101	37	74.9	3.46	
Rosadale	99	45	74.6	7.58	
Russellville	95	40	72.9	0.89	
Silversprings	94	37	70.1	2.03	
Spielerville	97	43	74.2	1.10	
Stuttgart	97	40	72.4	4.35	
Texarkana	98	44	75.9	0.89	
Warren	97	40	72.4	3.89	
Washington	91	44	72.3	3.39	
Wiggs	97	38	71.8	5.63	
Winchester	98	39	72.9	4.48	
Winslow	88	38	69.4	0.94	
Witts Springs	99	42	73.9	0.50	
California.					
Angiola	102	38	68.5	0.35	
Bakersfield	102	43	69.8	0.16	
Ballast Point L. H.	.....	.....	.....	0.03	
Bear Valley	.....	.....	.....	3.98	3.0
Berkeley	80	48	60.2	1.30	
Bishop	95	29	63.7	0.00	
Boca[*1]	79	30	57.2	0.40	4.0
Bodie	78	15	45.9	0.30	2.0
Bowman	88	34	57.6	4.12	8.0
Branscomb	.....	.....	.....	4.84	
Campbell	92	38	61.8	0.27	
Cape Mendocino L. H.	.....	.....	.....	3.30	
Cedarville	89	30	56.2	1.00	
Chico[*1]	93	54	69.4	0.79	
Cisco[*1]	79	37	54.8	2.41	11.0
Claremont	87	41	63.0	0.05	
Corning[*1]	98	55	70.6	0.50	
Crescent City	71	33	53.8	6.28	
Crescent City L. H.	.....	.....	.....	4.35	
Cuyamaca[*2]	84	32	56.2	0.08	
Delano[*1]	100	61	75.3	0.57	
Delta[*1]	98	48	67.0	2.28	
Drytown	97	44	67.5	1.05	
Dunnigan[*1]	100	50	70.4	0.13	
Durham[*5]	98	49	69.9	1.19	
East Brother L. H.	.....	.....	.....	0.45	
Edmanton[*1]	91	34	56.0	4.86	2.0
Elcajon	93	44	67.0	0.00	
Elmdale	102	40	67.8	0.20	
Elsinore	100	42	69.9	0.00	
Escondido	93	39	67.8	0.00	
Fallbrook	88	40	63.5	T.	
Folsom City[*1]	96	52	67.8	1.06	
Fordyce Dam	.....	.....	.....	3.25	19.0
Fort Ross	75	45	60.3	1.73	
Georgetown	93	41	64.7	4.50	
Gilroy (near)	99	40	64.6	0.22	
Grass Valley	.....	.....	.....	2.65	
Greenville	96	25	56.4	2.27	1.0
Hanford	100	35	68.6	1.04	
Healdsburg	100	30	62.5	0.91	
Hollister	94	38	62.5	0.25	
Humboldt L. H.	.....	.....	.....	4.51	
Idylwild	.....	.....	.....	0.00	
Indio[*1]	107	66	85.3	0.00	
Iowa Hill[*1]	89	44	64.1	4.12	
Irvine	88	56	72.1	0.00	
Jackson	88	40	62.8	3.39	
Jolon	.....	.....	.....	0.05	
Kennedy Gold Mine	91	41	63.2	3.50	
King City	.....	.....	.....	0.04	
Kono Tayee	89	49	67.2	0.54	
Laguna Valley	.....	.....	.....	0.00	
Lamesa	.....	.....	.....	0.05	
Laporte[*1]	82	33	51.3	5.26	11.7
Las Fuentes Ranch	.....	.....	.....	0.00	
Legrand	.....	.....	.....	0.48	
Lemoncove	102	47	75.2	0.45	
Lick Observatory	88	30	58.8	1.08	
Lime Point L. H.	.....	.....	.....	0.65	
Lodi	96	45	66.8	0.37	
Los Gatos[b]	92	43	63.6	0.90	
Mammoth[*1]	105	65	86.6	0.00	
Manzana	100	46	72.0	T.	
Mare Island L. H.	.....	.....	.....	0.39	
Merced[b]	102	43	69.6	0.65	
Mills College	.....	.....	.....	0.65	
Milo	.....	.....	.....	0.51	
Milton (near)	97	46	69.6	0.91	
Modesto[*1]	104	51	72.8	0.05	
Mohave[*1]	98	50	70.7	0.00	
Mokelumne Hill[*2]	.....	45	62.4	2.77	
Monterio	98	44	70.5	0.00	
Monterey[*5]	86	53	63.8	0.62	
Mountainview	.....	.....	.....	0.40	
Mount St. Helena	.....	.....	.....	2.00	
Napa	95	43	63.1	0.89	
Needles	103	65	84.2	0.00	
Nevada City	85	37	59.8	3.36	
Newhall[*1]	94	50	67.2	0.10	
Niles[*1]	96	50	64.2	0.32	
North Bloomfield	95	38	63.2	4.51	
North Ontario	87	48	65.4	0.00	
North San Juan[*1]	92	42	58.8	3.16	
Oakland	82	47	61.1	1.01	
Ogilby[*5]	110	69	91.6	0.00	
Oleta[*1]	92	40	61.9	2.84	
Orland[*1]	105	50	72.1	0.56	
Palermo	102	43	68.4	0.96	
Palomar Mountain	.....	.....	.....	0.00	
Paso Robles	98	36	63.0	0.04	
Peachland[*5]	90	46	63.6	1.28	
Piedras Blancas L. H.	.....	.....	.....	0.73	
Pigeon Point L. H.	.....	.....	.....	0.28	
Pilot Creek	.....	.....	.....	5.42	
Pine Crest	84	49	63.4	0.39	
Placerville	88	38	60.6	3.13	
Point Ano Nuevo L. H.	.....	.....	.....	0.62	
Point Arena L. H.	.....	.....	.....	1.10	
Point Bonita L. H.	.....	.....	.....	1.24	
Point Conception L. H.	.....	.....	.....	0.07	
Point Fermin L. H.	.....	.....	.....	0.00	
Point George L. H.	.....	.....	.....	2.10	
Point Hueneme L. H.	.....	.....	.....	0.10	
Point Lobos	68	50	56.8	0.61	
Point Loma L. H.	.....	.....	.....	0.00	
Point Montara L. H.	.....	.....	.....	1.45	
Point Pinos L. H.	.....	.....	.....	0.85	
Point Sur L. H.	.....	.....	.....	0.73	
Pomona (near)	92	44	68.2	0.00	
Poway	.....	.....	.....	T.	
Quincy	88	28	56.5	2.79	
Ranch House	.....	.....	.....	0.00	
Redding	100	43	70.6	3.11	
Redlands	95	41	69.0	0.00	
Reedley	101	44	73.2	0.65	
Represa	90	48	66.4	1.15	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Roe Island L. H.	.....	.....	.....	0.45	
Rohnerville	.....	.....	.....	2.93	
Rosewood	102	35	67.6	1.41	
Sacramento	90	45	64.8	0.64	
Salinas[*1]	74	53	60.4	0.38	
San Bernardino	100	39	68.0	0.07	
San Jacinto	97	43	68.6	0.06	
San Jose	93	44	65.3	0.44	
San Leandro	85	46	61.6	0.93	
San Luis L. H.	.....	.....	.....	0.35	
San Mateo[1*]	86	53	66.2	0.75	
San Miguel[*1]	96	45	66.1	0.00	
Santa Barbara	82	49	61.6	0.36	
Santa Barbara L. H.	.....	.....	.....	0.15	
Santa Clara	.....	.....	.....	0.36	
Santa Cruz	90	38	59.2	0.64	
Santa Cruz L. H.	.....	.....	.....	0.71	
Santa Monica	.....	.....	.....	0.00	
Santa Paula	84	45	65.2	0.71	
Santa Rosa[*1]	92	44	61.0	1.17	
Shasta	105	40	72.4	2.75	
Sierra Madre	84	48	65.0	0.03	
Sonoma	.....	.....	.....	0.80	
S. E Farallone L. H.	.....	.....	.....	0.56	
Stanford University	90	43	62.2	0.45	
Stockton	92	46	65.2	0.45	
Storey	100	49	70.8	0.73	
Summerdale	86	29	57.1	3.24	1.0
Susanville	87	32	56.9	0.59	
Tehama[*1]	100	50	72.4	0.80	
Tejon Ranch	97	47	72.4	0.00	
Trinidad L. H.	.....	.....	.....	4.51	
Truckee[*1]	82	30	46.4	0.50	5.0
Tulare *b*	.....	.....	.....	0.42	
Tulare *c*	102	44	69.5	0.42	
Uklah	102	34	64.6	1.40	
Upperlake	101	37	65.6	1.11	
Upper Mattole[1*]	88	36	57.6	5.14	
Vacaville[*1]	98	48	69.0	0.40	
Ventura	75	48	61.0	0.09	
Visalia	101	42	68.2	0.44	
Volcano Springs[1*]	114	66	87.1	0.00	
Wasco	102	44	79.8	0.35	
Westpoint	.....	.....	.....	4.20	
West Saticoy	.....	.....	.....	0.15	
Wheatland	95	46	66.8	0.81	
Williams[*5]	97	50	73.4	T.	
Wilmington[*1]	78	48	61.3	0.05	
Wire Bridge[*5]	95	48	68.4	2.41	
Yerba Buena L. H	.....	.....	.....	0.70	
Yreka	90	38	59.6	1.24	
Yuba City[*5]	95	52	75.0	1.68	
Zenia	.....	.....	.....	4.02	
Colorado.					
Amity	93	31	67.0	0.96	
Ashcroft	.....	.....	.....	0.30	
Bailey	80	23	53.2	0.34	
Blaine	95	33	67.1	1.12	
Boulder	86	35	61.7	0.16	
Boxelder	.....	.....	.....	0.49	
Breckenridge	71	12	45.6	0.08	0.8
Buenavista	.....	.....	.....	0.03	
Canyon	88	34	62.7	0.43	
Castlerock	85	27	58.6	0.50	
Cedaredge	87	25	60.4	0.48	
Cheyenne Wells	90	30	64.4	1.12	
Colibran	86	27	60 4	0.13	
Colorado Springs	83	27	58.8	2.20	
Delta	93	25	63.7	0.01	
Durango	86	24	59.2	0.33	
Fort Collins	87	29	59.1	2.25	
Fort Morgan	89	29	61.2	0.73	
Fox	.....	.....	.....	2.50	
Gilman	.....	.....	.....	0.07	
Gleneyrie	79	26	57.4	2.36	
Glenwood Springs	.....	.....	.....	T.	
Greeley	88	31	61.6	1.06	
Grover	.....	.....	.....	1.65	
Gunnison	81	14	52.4	0.37	
Hamps	85	27	59.4	0.52	
Hoehne	90	31	65.0	0.29	
Holly	95[d]	36[d]	69.8[d]	1.09	
Hugo	.....	.....	.....	1.00	
Husted	83	27	57.2	1.05	
Lake Moraine	65	22	48.2	1.09	
Lamar	96	34	69.5	0.74	
Laporte	.....	.....	.....	0.97	
Las Animas	96	35	67.4	T.	
Lay	85	17	53.4	0.08	
Leadville (near)	.....	.....	.....	0.07	T.
Leroy	87	32	60 8	0.27	
Longs Peak	70	19	48.0	1.59	
Mancos	85[d]	20[d]	57.9[d]	0.24	
Marshall Pass	.....	.....	.....	0.08	
Meeker	84	21	54.8	0 28	
Mitchell	.....	.....	.....	T.	T.
Montrose	.....	.....	.....	0.00	
Moraine	75	20	50.4	0.42	
Pagoda	82	18	53.4	0.20	
Parachute	90	32	62.8	0.39	
Perrypark	.....	.....	.....	0.90	
Rangely	87	24	57.1	0.12	
Rockyford	93	33	65.6	0.48	
Rogers Mesa	89	25	63.2	0.18	
Ruby	.....	.....	.....	0.42	1.2
Russell	78	13	50.4	0.34	
Saguache	84	28	57.2	1.07	
Salida	88	23	58.1	0.10	
San Luis	81	17	55.2	0.77	
Santa Clara	80	27	56.4	0.73	
Sapinero	.....	.....	.....	0.15	
Seibert	.....	.....	.....	1.26	
Silt	84	29	61.8	0.19	
Sugarloaf	77	27	54.8	0.50	
Telluride	78	17	53.8	0.15	0.2
Trinidad	90	37	64.6	1.25	
T. S. Ranch	86	32	62.6	0.00	
Twinlakes	.....	.....	.....	0.31	T.
Vilas	.....	.....	.....	1.23	
Wagon Wheel	77	9	47.6	0.58	
Wallet	.....	.....	.....	2.86	
Westcliffe	77	23	53.3	0.29	
Whitepine	.....	.....	.....	0.21	
Wray	91	31	63.4	2.11	
Connecticut.					
Bridgeport	88	40	65.1	5.71	
Canton	87	34	61.4	5.76	
Colchester	87	36	64.2	5.47	
Falls Village	.....	.....	.....	4.21	
Hartford *b*	85	39	63.4	5.75	
Hawleyville	87	36	62.7	5.02	
Lake Konomoc	.....	.....	.....	8.17	
Middletown	89	36	64 1	6.57	
New London	85	43	64.4	4.92	
North Grosvenor Dale	92	35	63.0	4.17	
Norwalk	88	38	63.6	3.08	
Southington	83	36	62.7	6.60	
South Manchester	.....	.....	.....	5.51	
Storrs	87	38	62.3	4.33	
Voluntown	90	32	63.2	4.91	
Waterbury	93	35	64.5	6.25	
West Cornwall	86	38	62.0	4.52	
West Simsbury	.....	.....	.....	5.16	
Delaware.					
Milford	94	45	68.6	2.15	
Millsboro	91	45	68.3	2.35	
Newark	88	42	66.7	3.79	
Seaford	91	46	68.8	1.51	
District of Columbia.					
Receiving Reservoir[*5]	85	47	67.8	1.96	
West Washington	93	40	67.0	2.00	
Florida.					
Archer	94	60	77.7	4.81	
Bartow	92	69	81.2	8.87	
Brooksville	92	69	78.9	5.10	
Carrabelle	89	62	76.4	3.96	
Clermont	95	67	79.8	11.20	
De Funiak Springs	93	56	75.6	7.38	
Deland	92	64	78.9	.....	
Earnestville	.....	...	.....	10.98	
Eustis	98	68	80.8	13.75	
Federal Point	93	65	78.2	10.20	
Flamingo	95	71	82.4	11.52	
Fort Meade	98	64	80.3	11.90	
Fort Pierce	92	68	79.8	6.84	
Gainesville	93	65	78.4	4.08	
Huntington	96	61	79.3	11.27	
Hypoluxo	93	70	81.3	10.66	
Inverness	95	63	79 0	4.12	
Kissimmee	94	65	80.0	12.95	
Lake Butler	96	61	77.6	3.37	
Lake City	96	62	78.4	5.18	
McAlpine	98	60	78.8	6.35	
Macclenny	97	62	78.4	7.88	
Manatee	94	67	80.1	13.47	
Marco	96	72	83.0	8.36	
Marianna	93	56	75.2	4 67	
Merritt Island	91	72	81.0	9.32	
Miami	90	68	80.9	15.30	
Middleburg	94	59	76.1	13 56	
Myers	92	70	79.8	6.86	
New Smyrna	92	64	78.7	17.55	
Nocatee	96	66	81.4	4 23	
Ocala	98	63	79.4	7.47	
Orange City	95	63	77.8	6.22	
Orlando	92	69	79.6	11.12	
Rockwell	96	64	80 4	7.40	
St. Andrews	93	60	77.2	5.82	
St. Augustine	91	72	81.8	9.38	
Stephensville[*1]	.....	.....	.....	3 75	
Sumner	96	60	78.5	4 27	
Switzerland	94	62	78.2	13.08	
Tallahassee	91	54	75.2	5.84	
Tarpon Springs	95	68	80.6	7.90	
Titusville	92	66	79.4	8.10	
Wausau	94	54	75.7	9.19	
Wewahitchka	95	58	76.6	5.64	
Georgia.					
Adairsville	88	47	69.7	4.39	
Albany	94	56	75.8	5.56	
Allapaha	94	55	75.5	4.69	
Allentown	95	52	75.0	10.54	
Americus	92	53	74.0	13.28	
Athens *b*	84	50	69.6	3.30	
Auburn	90	49	70.8	3.72	
Bainbridge	92	55	74.6	4.42	
Blakely	92	55	74.7	6.66	
Bowersville	89	45	70.2	4.87	
Brent	97	51	73.2	6.88	
Camak	93	52	72.7	8.33	
Canton	.....	.....	.....	2.76	
Carlton	.....	.....	.....	7.37	
Clayton	83	42	66.1	4.01	
Columbus	90	56	74.6	6.36	
Covington	94	50	72.5	4.49	
Dahlonega	87	46	68.4	5.83	
Diamond	83	41	65.6	6.35	
Dublin	.....	...	.....	4.54	
Eastman	99	55	76.3	3.57	
Elberton	90	52	72.1	7.51	
Experiment	91	51	71.5	4.29	
Fitzgerald	99	54	76.4	4.85	
Fleming	101	55	77.0	2.98	
Fort Gaines	93	52	74.4	10.03	
Gainesville	88	49	69.6	4.65	
Gillsville	92	48	70.6	5.38	
Griffin	92	51	72.4	4.61	
Harrison	94	54	74.6	5.58	
Hawkinsville	90	56	74.6	7.87	
Hephzibah	96	55	75.2	2.66	
Jesup	95	57	76.4	2.96	
Lost Mountain	93	48	70.4	2.83	
Louisville	92	55	73.9	4.33	
Lumpkin	95	54	74 8	9.76	
Marshallville	92	57	75.6	9.38	
Mauzy	99	57	77.2	4.41	
Milledgeville	87	54	71.8	5.50	
Millen	97	53	75.5	2.79	
Morgan	92	50	74.0	6.30	
Naylor	95	58	77.2	4.12	
Newnan	90	49	70.2	7.41	
Oakdale	.....	.....	.....	3.69	
Point Peter	92	50	72.3	7.35	
Poulan	95	54	75.3	3.45	
Putnam	.....	.....	.....	9.61	
Quitman	93	58	75.7	5.54	
Ramsey	86	42	68.2	3.85	
Resaca	.....	.....	.....	3.45	
Rome	91	46	70.2	3.75	
Statesboro	92[h]	54[h]	74.2[h]	1.25	
Talbotton	93	50	72.3	5.76	
Thomasville	94	58	77.0	5 55	
Toccoa	88	48	70.0	4.49	
Union Point	89	50	70.9	5.20	
Valona	96	62	77.2	2.97	
Vidalia	96	57	76.4	2.44	
Washington	90	53	72.2	6.12	
Waverly	98	60	77.5	7.63	
Waycross	95[c]	60[c]	77.0[c]	3.76	
Waynesboro	96	52	74.4	2.23	
Westpoint	90	52	72.6	5.63	
Woodbury	93	48	71.2	4.18	
Idaho.					
Albion	88	28	57.2	1.19	
American Falls	87	26	55.2	0.55	
Atlanta	80	25	47.8	2.19	
Blackfoot	82	28	55.8	0.50	
Burnside	83	29	52.6	0.60	
Chesterfield	81	11	46.0	0.39	
Downey	82	25	53.1	0.09	
Forney	80	19	47.2	2.22	
Garnet	90	36	62.8	0.42	
Hailey	85	28	53.2	0.90	
Idaho City	78	30	51.7	0.18	
Lakeview	76	27	52.7	2.79	
Lost River	81	26	52.2	1.23	
Moscow	79	35	52.8	1.36	
Murray	72	29	49.4	3.15	
Oakley	92	26	54.1	0.70	
Ola	85	32	57.6	1.09	
Paris	88	22	54 8	.....	
Payette	97	35	61.8	0.40	
Pollock	87	34	55.7	1.01	
Porthill	74	29	50 2	1.51	
Priest River	76	29	51.8	2 96	
Riddle	85	25	53.9	0.28	
St Maries	79	29	54.4	2 49	
Swan Valley	86	19	50.0	0.98	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Idaho—Cont'd.	°	°	°	*Ins.*	*Ins.*
Vernon	85	23	51.2	0.55	
Weston	88	28	56.0	0.66	
Illinois.					
Albion	95	36	68.6	1.99	
Aledo	93	35	65.8	2.36	
Alexander	94	33	67.0	1.54	
Antioch	89	30	61.4	1.97	
Ashton	93	32	63.4	2.13	
Astoria	93	35	65.0	2.63	
Aurora *a*	98	31	63.8	2.34	
Bloomington	97	32	67.1	1.87	
Bushnell	98	35	66.8	2.60	
Cambridge	92	37	64.4	2.17	
Carlinville	97	33	68.8	0.83	
Centralia	99	33	71.0	1.50	
Chemung	90	29	60.3	2.95	
Chester				1.55	
Cisne	99	32	69.6	1.84	
Coatsburg	97	33	68.0	2.51	
Cobden	98	37	71.8	0.77	
Danville	90	32	66.8	0.40	
Decatur	95	32	67.2	1.27	
Dixon	96	33	64.8	2.36	
Dwight	94	21	64.7	2.05	
Effingham	94	33	69.0	0.40	
Equality	97	33	70.1	0.85	
Flora	95	33	67.8	0.84	
Galva	95	34	63.8	2.84	
Grafton				0.45	
Grayville	93[b]	39[b]	68.6[b]	2.40	
Greenville	100	30	70.4	1.17	
Griggsville	96	36	68.7	3.65	
Halfway	95	36	70.2	1.64	
Halliday	97	31	70.2	0.74	
Havana	94	34	66.4	1.61	
Henry	96	32	64.4	2.56	
Hillsboro	95	36	68 8	1.03	
Joliet	89	34	63.6	2.55	
Kishwaukee	94	28[c]	60.8	3.34	
Knoxville	93	30	62.7	2.40	
Lagrange	90	35	63.2	3.56	
Laharpe	97	35	66.2	2.07	
Lanark	94	29	62.2	2.58	
La Salle	90	34	65.4	2.25	
Loami				1.47	
McLeansboro	96	34	69.5	0.94	
Martinton	95	31	64.9	1.82	
Mascoutah	96	32	66.7	1.80	
Mattoon	90	36	69.6	1.46	
Melrose	96	30	68.6	0.42	
Minonk	93	32	64.5	1.92	
Monmouth	98	32	64.1	3.00	
Monticello	90	33	66.7	1.80	
Morgan Park				3.68	
Morrison	94	32	62.4	2.19	
Morrisonville	96	32	68.4	1.50	
Mount Carmel				2.14	
Mount Pulaski	99	33	68.1	2.60	
Mount Vernon	98	35	70.2	1.53	
New Burnside	97	33	71.2	1.00	
Olney	95	35	70.0	1.07	
Ottawa	96	35	65.8	3.20	
Palestine	93	32	66.6	1.38	
Pana	96	33	68.3	1.73	
Paris	94	35	69.4	1.56	
Peoria *a*				3.51	
Peoria *b*	93	37	66.5	2.64	
Philo	94	30	66.2	1.19	
Plumhill	98	33	71.4	1.02	
Rantoul	94	34	66.0	2.71	
Raum	97	38	71.8	1.47	
Riley	93	35	63.0	2.01	
Robinson	95	34	69.0	1.37	
Rockford	90	34	62.4	2.85	
St. Charles	90	35	63.4	2.38	
St. John	98	32	69.6	0.45	
Scales Mound	94	33	62.6	3.00	
Shobonier	98	28	68.9	0.71	
Strawn	92	33	63.4	2.52	
Streator	91	32	63.1	2.20	
Sullivan	96	31	67.8	1.04	
Sycamore	89	32	62.8	2.18	
Tilden	97	33	68.6	2.37	
Tiskilwa	90	35	64.0	2.10	
Tuscola	96	33	67.8	1.04	
Walnut	94	35	65.1	2.06	
Wellington	90	35	65.9	5.41	
Winchester	97	34	68.3	1.95	
Winnebago	95	32	63.0	3.15	
Yorkville	94	31	63.6	3.36	
Zion	93	34	62.7	2.10	
Indiana.					
Anderson	91	32	67.1	1.06	
Angola	87	34	63.4	0.87	
Auburn	88	31	62.2	1.30	
Bloomington	91	37	68.6	0.99	
Bluffton	93	30	65.1	1.12	
Butlerville	93	33	67.4	2.19	
Cambridge City	90	32	63.8	1.97	
Columbus	96	33	67.5	2.35	
Connersville	91	33	65.8	1.29	
Crawfordsville [b]	97	37	69.2	0.85	
Delphi	95	32	65.6	0.78	
Edwardsville [b 1]	89	41	69.4	2.42	
Farmland	87	33	65.2	1.43	
Greencastle	88	36	66.8	0.56	
Hammond	90	34	65.0	1.83	
Hector	90	32	68.2	1.81	
Huntington	90			1.70	
Jeffersonville	92	41	68.6	3.05	
Knightstown	92	34	67.0	1.62	
Kokomo	88	35	65.9	1.34	
Lafayette	93	33	66.8	1.34	
Laporte	94	38	65.6	2.82	
Logansport	91	35	65.0	0.88	
Madison *a*	91	39	68.4	1.76	
Madison *b*				1.71	
Marengo	93	33	66.1	2.40	
Marion	93	30	66.2	1.30	
Markle	90	30	64.6	1.10	
Mauzy	92	34	66.3	1.72	
Mount Vernon	98	36	71.8	0.91	
Northfield	90	29	64.4	0.68	
Paoli	96	32	68.4	2.39	
Prairie Creek	97	31	70.2	1.44	
Princeton	95	33	67.3	2.55	
Rensselaer [d]	96	37	64.4		
Richmond	92	32	65.4	1.18	
Rockville	90	33	67.0	0.81	
Salem	97	32	68.6	2.02	
Scottsburg	92	38	68.0	1.87	
Seymour	87	38	65.6	3.19	
Shelbyville				1.35	
South Bend	93	39	65.2	1.42	
Syracuse	94	30	65.0	0.77	
Terre Haute	97	35	69.7	0.42	
Topeka	87	33	63.5	0.65	
Valparaiso	93	39	65.2	1.76	
Veedersburg	92	31	67.4	T.	
Vevay	92	37	68.6	2.60	
Vincennes	96	37	70.5	2.40	
Washington	94	34	68.9	2.63	
Winamac	94	29	64.4	1.08	
Worthington	94	31	68.4	0.92	
Indian Territory.					
Ardmore	107	45	78.3	1.23	
Bengal	95	41	72.0	2.00	
Chickasha	96	38	74.1	0.35	
Claremore				1.30	
Durant	97	43	74.7	1.54	
Fairland	96	33	71.3	1.62	
Hartshorne	96	41	74.4	2.24	
Healdton	99	36	75.6	T.	
Holdenville	94	38	73.6	1.04	
Marlow	98	40	74.6	1.05	
Muscogee	98	39	73.8	0.81	
Pauls Valley	95	35	71.8	0.42	
Roff	98	42	75.4	2.00	
Ryan	98	45	77.3	0.55	
South McAlester				4.03	
Tahlequah	99	36	73.7	2.15	
Tuisa				1.70	
Wagoner	101	34	74.1	0.50	
Webbers Falls	104	37	75.6	1.76	
Iowa.					
Afton	95	29	62.9	3.56	
Albia	98	31	64.6	2.36	
Algona	90	33	60.6	9.40	
Alta	92	32	60.4	6.53	
Amana	93	35	63.8	1.71	
Ames *b*	93	35	61.6	3.45	
Atlantic	94	26	63.4	3.71	
Battle Creek				5.45	
Baxter	95	34	63.4	2.79	
Belknap	95	34	67.0	2.40	
Belleplaine	94	35	65.2	2.50	
Bonaparte	97	35	67.2	2.46	
Britt	92	29	60.0	8.37	
Buckingham				2.23	
Burlington	97	37	67.6	2.26	
Bussey				1.60	
Carroll	93	29	60.7	8.34	
Cedar Rapids	93	35	65.4	2.64	
Centerville	94	32	66.4	2.43	
Chariton	96	32	65.2	2.03	
Charles City	91	33	61.6	5.21	
Clarinda	96	29	66.1	4.89	
Clearlake	95[c]	34	61.4	6.00	
Clinton	93	33	63.2	2.52	
College Springs	95	24	65.4	3.18	
Columbus Junction	97	36	66.7	2.54	
Corning	92	29	63.9	3.34	
Council Bluffs	95	30	65.8	5.35	
Cresco	93	32	59.2	6.40	
Cumberland				2.87	
Danville				2.47	
Decorah	92	34	60.6	7.38	
Delaware	93	32	61.7	3.77	
Denison	94	29	62.1	7.45	
Desoto	93	35	64.8	2.64	
Dows	91	31	61.1	6.52	
Eldon	99	33	66.4	2.72	
Elkader	97	33	62.8	4.04	
Emerson				3.66	
Estherville	87[c]	31	58.3[c]	6.14	
Fonda				13.62	
Forest City	90	29	60.8	9.48	
Fort Dodge	94	30	62.8	7.13	
Fort Madison				2.20	
Galva	92	29	62.8	7.12	
Gilman				2.64	
Glenwood	94	27	65.0	3.43	
Grand Meadow	93	36	59.2	5.96	
Greene	92	32	62.4	4.79	
Greenfield	96	29	64.4	3.53	
Grinnell	92	34	64.4	2.29	
Grinnell (near)	92	34	64.6	2.53	
Grundy Center	91	31	62.4	2.97	
Guthrie Center	91	30	62.8	4.17	
Hampton	95	34	63.6	6.38	
Harlan	92	28	64.2	8.02	
Hawkeye				5.83	
Hopeville	94	32	64.8	2.61	
Humboldt	92	34	61.8	8.24	
Independence	93	32	62.1	3.18	
Indianola	97	33	64.9	4.53	
Iowa City	101	26	65.7	2.56	
Iowa Falls	92	32	61.0	4.36	
Jefferson				6.12	
Keosauqua	95	38	67.3	2.94	
Knoxville	95	36	65.8	2.43	
Lacona				1.90	
Larchwood				4.77	
Larrabee	92	29	60.6	10.77	
Leclaire				1.75	
Lemars	89	29	60.6	6.97	
Lenox	91	29	64.5	4.46	
Logan	93	26	62.3	7.66	
Maple Valley				7.31	
Maquoketa	97	32	63.6	3.27	
Marshalltown	95	33	64.2	2.62	
Monticello	95	34	62.3	3.29	
Mooar				2.18	
Mountayr	96	30	65.5	3.12	
Mount Pleasant	96	32	63.6	2.64	
Mount Vernon *b*	96	36	65.8	2.74	
New Hampton	91	32[d]	60.9	4.98	
Newton	94	35	64.2	2.98	
Northwood	90	31	60.4	9.37	
Odebolt	94	30	62.3	7.93	
Ogden	92	31	63.0	6.87	
Olin	90	35	62.4	2.85	
Onawa	92	28	63.6	8.29	
Osage	86	32	59.4	5.70	
Osceola	95	32	63.6	2.42	
Oskaloosa	98	34	65.0	2.29	
Ottumwa	91	35	67.0	4.15	
Ovid	97	30	66.8	2.23	
Pacific Junction	95	27	65.2	2.62	
Pella [g]	97	34	63.5		
Perry	98	33	63.6	4.45	
Plover	95	31	61.4	13.55	
Primghar	95[b]	35[d]	62.6[c]		
Redoak	90	34	65.6	3.79	
Ridgeway	90	33	61.4	7.06	
Rockwell City	91	33	62.4	7.06	
Ruthven				7.77	
Sac City	94	32	62.0	10.15	
St. Charles	95	34	65.1	2.85	
Scranton	91	33	62.6	4.66	
Sheldon	91	31	60.8	6.04	
Sibley	94	31	60.3	6.37	
Sigourney	102	35	66.0	2.02	
Sioux Center	90	31	61.0	6.03	
Spirit Lake	92	32	59.8	8.02	
Storm Lake	90	33	61.4	6.92	
Thurman	90	28	64.0	5.25	
Tipton	94	36	65.8	2.00	
Toledo	98	32[c]	63.6	3.15	
Vinton [b 1]	92	35	62.5	2.95	
Wapello	95	39	64.9	2.44	
Washington	97[c]	33[c]	64.2[c]	1.74	
Washta				6.58	
Waterloo	94	33	62.8	3.57	
Waverly	93	34	62.8	4.78	
Westbend	93	31	60.8	9.77	
Wilton Junction	95	32	63.6	2.56	
Winterset	100	32	66.2	2.84	

TABLE II.—*Climatological record of voluntary and other cooperating observers.*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Iowa—Cont'd.	°	°	°	*Ins.*	*Ins.*
Woodburn	.....	.....	.....	2.59	
Kansas.					
Abilene	96	35	69.4	3.37	
Achilles	94	30	63.4	5.67	
Altoona	99	37	71.2	3.99	
Anthony	.....	.....	.....	0.85	
Atchison	95	35	70.2	2.59	
Baker	95	32	66.0	3.32	
Beloit	94	.....	.....	2.50	
Burlington	99	35	69.9	2.22	
Chanute	99	37	71.0	4.17	
Colby	95	32	65.0	1.46	
Columbus	97	39	71.0	2.35	
Coolidge	95	31	67.0	1.09	
Delphos	96	30	70.0	2.67	
Dresden	95	33	64.8	1.88	
Ellinwood	97	32	69.9	3.60	
Emporia	93	37	68.8	4.75	
Englewood	99	32	72.4	0.22	
Eureka	95	29	68.0	3.46	
Fallriver	96	34	70.0	5.22	
Farnsworth *[1]	94	37	66.8	3.04	
Fort Leavenworth	94	37	68.8	3.65	
Fort Scott	98	38	70.4	2.77	
Frankfort	100	30	68.4	3.70	
Garden City	94	35	69.2	4.57	
Gove *[1]	89	40	64.1	2.85	
Grenola	97	33	70.6	1.63	
Hanover	95	43	70.0	2.02	
Harrison	95	31	67.8	3.49	
Hays	95	30	67.2	2.58	
Horton	96	34	67.8	2.95	
Hoxie	95	29	67.0	2.20	
Hutchinson	97	32	70.0	2.49	
Independence	100	37	73.2	1.51	
Jetmore	98	33	71.0	2.39	
Lakin	93	34	67.7	2.83	
Lawrence	92	38	68.4	3.36	
Lebanon	94	31	67.6	3.50	
Lebo	97	36	69.2	3.44	
Leoti	97	32	67.0	1.39	
Little River	95	34	70.0	2.85	
Macksville	98	30	69.8	3.06	
McPherson	96	34	71.8	2.22	
Madison	96	34	68 6	4.07	
Manhattan c	98	32	69.0	4.49	
Medicine Lodge	99	38	71.4	3.14	
Minneapolis	96	31	68.6	1.98	
Moran	97	35	69.4	3.73	
Mounthope *[1]	92	38	70.0	4.04	
Ness City	96	37	71 1	9.74	
Newton	94	33	70 0	4.24	T.
Norwich	95	37	71.8	3.27	
Oberlin	.....	.....	.....	5.37	
Olathe	95	35	78.6	4.16	
Osborne	.....	.....	.....	0.50	
Oswego	99	37	72.9	3.35	
Ottawa	96	33	67.7	5.21	
Phillipsburg	96	34	67.6	5.07	
Pratt	99	32	71.0	2.16	
Rome	99	31	72.2	1.47	
Salina	98	33	70.4	2.22	
Scott	93	29	65.4	1.80	
Sedan	94	35	70.4	1.17	
Seneca	94	31	68.0	2.19	
Toronto	98	35	69.2	5 38	
Tribune	94	35	65.4	1.28	
Ulysses	95	33	69.5	4.60	
Viroqua	94	33	69.0	1.85	
Wakeeney (near)	.....	.....	.....	3.43	
Wallace	.....	.....	.....	1.69	
Wamego *[1]	94	37	68.2	2.99	
Winfield	93	35	71.8	2.74	
Yates Center	95	32	67.6	4.39	
Kentucky.					
Alpha	93	40	67.6	4.46	
Anchorage	93	36	67.5	2.38	
Bardstown	95	36	69.2	3.26	
Berea	90	36	66.4	4.15	
Blandville	91	39	69.2	3.40	
Bowling Green	90	40	68.4	5.38	
Burnside	90	.....	.....	4.86	
Carrollton	90	44	68.8	2.31	
Catlettsburg	88	40	67.5	5.47	
Centertown	95	37	69.2	4.46	
Earlington	93	37	68.2	4.82	
Edmonton	94	36	68.0	5.66	
Eubank	87	38	65.6	6.19	
Falmouth	.....	.....	.....	2.02	
Fords Ferry	96	33	69.0	2.32	
Frankfort	89	41	68.2	2.73	
Franklin	89	39	69.8	3.25	
Georgetown[d]	87	40	66.4	.....	
Greensburg	98	39	68.6	3.87	
Henderson	93	39	69.6	1.58	
Hopkinsville	96	38	68.9	4.65	
Kentucky—Cont'd.					
Irvington	93	36	68.0	3.38	
Leitchfield	91	40	67.4	6.49	
Loretto	92	34	67.2	2.87	
Manchester	95[d]	39[d]	69.6[d]	5.20	
Marrowbone	88	34	66.0	3.75	
Maysville	93	37	68.2	2.94	
Mount Sterling	86	38	65.4	3.57	
Owensboro	92	40	68.9	1 41	
Owenton	89	39	66.8	2.72	
Paducah *a*	.....	.....	.....	4.01	
Paducah *b*	97	44	73.3	4.65	
Pikeville [b]	89	43	67.8	4.15	
St. John	91	37	66.8	4.15	
Scott	93	37	68.4	1.06	
Shelby City	92	35	65.6	3.49	
Shelbyville	93	37	67.6	4.11	
Vanceburg	84	40	62.6	3.50	
Warfield	86	41	66.7	4.76	
Williamsburg	89	41	68.0	5.35	
Louisiana.					
Abbeville	89	48	76.0	5.20	
Alexandria	97	48	76.4	11.09	
Amite	97	48	76.3	4.09	
Baton Rouge	94	47	76.2	2.87	
Burnside	93	46	76.2	7.09	
Calhoun	94	43	72.2	3.58	
Cameron	89	50	76.8	10.49	
Cheneyville	.....	46	.....	3.16	
Clinton	91	47	75.2	2.46	
Collinst n	98	44	74.4	1.99	
Covington	95	50	77.8	1.32	
Donaldsonville	93	50	77.8	3.83	
Emilie	91	50	75.9	1.96	
Farmerville	92	46	74.2	3.48	
Franklin	93	51	77.3	2.31	
Grand Coteau	91	47	75.7	4.34	
Hammond	95	47	77.4	2.83	
Houma	94	52	77.0	2.34	
Jennings	93	46	75.8	2.72	
Lafayette	94	46	76.4	2.66	
Lake Charles	92	50	77.0	4.04	
Lake Providence	93	48	74.4	7.86	
Lawrence	97	60	78.6	1.63	
Libertyhill	96	44	74.0	4.99	
Mansfield	94	41	73.6	7.68	
Melville	95	45	76.0	4.10	
Minden	99	45	75.2	3 58	
Monroe	97	45	74.8	2.33	
New Iberia	90	47	76.0	6.80	
Opelousas	92[1]	45	75.6	3.55	
Oxford	95	45	72.8	9.10	
Paincourtville	91	49	75.0	3.54	
Plain Dealing	94	44	72.8	3.70	
Prevost	.....	.....	.....	0.41	
Rayne	94	44	76.9	4.56	
Reserve	92	52	76.7	3.04	
Ruddock	94	52	76.1	1.18	
Ruston	94	44	73 5	4.13	
Schriever	95	49	76.5	2.47	
Southern University	91	51	74.0	.....	
Sugar Ex. Station	91	54	77.1	3.88	
Sugartown	92	49	76.2	4.00	
Venice	95	61	79.4	1.21	
Wallace	95	52	76.7	3.46	
White Sulphur Springs	99	45	75.9	5.32	
Maine.					
Bar Harbor	87	34	60.3	3.28	
Belfast	85	32	59.4	2.50	
Bemis	80	30	55.5	1.87	
Calais	88	32	59.7	2.77	
Carmel	87	33	59.2	3.58	
Cornish	90	31	61.1	3.06	
Fairfield	89	33	61.8	3.79	
Farmington	90	28	59.1	2.25	
Flagstaff	87	20	57.4	1.65	
Gardiner	88	33	62.0	2.08	
Kineo	85	34	58.0	0.94	
Lewiston	92	36	62.5	1.75	
Mayfield	86	32	58.0	2.63	
North Bridgton	94	30	62.2	2.55	
Orono	89	28	59.4	4.22	
Rumford Falls	88	29	58.2	2.59	
Winslow	90	28	61.4	3.92	
Maryland.					
Annapolis	93	47	70.6	4.50	
Bachmans Valley	87	36	63.5	6.46	
Boettcherville	92	38	65.2	2.44	
Boonsboro *a*	87	40	65.5	2.03	
Cambridge	91	54	71.0	.....	
Chase	90	38	66.3	4.49	
Cheltenham	93	42	67.8	2.83	
Chestertown	86	44	67.4	2.70	
Chewsville	91	35	65.8	2.51	
Clearspring	85	41	64.4	3.37	
Coleman	.....	.....	.....	2.03	
Collegepark	90[1]	37	64.4[d]	3.69	
Maryland—Cont'd.					
Cumberland *b*	.....	.....	.....	2.87	
Darlington	88[c]	41[c]	65.9[c]	3.54	
Deerpark	83	29	58.2	1.76	
Easton	91	45	69.1	1.65	
Fallston	89	41	66.8	5.36	
Frederick	89	42	67.2	3.36	
Frostburg	83	35	62.8	2.83	
Grantsville	84	32	60.0	2.24	
Greatfalls	92	43	66.5	2.49	
Greenspring Furnace	88	38	65.8	2.38	
Hancock	92	35	66.0	2.88	
Harney	.....	.....	.....	3.16	
Jewell	92	46	67.4	2.72	
Johns Hopkins Hospital	92	43	68.2	2.77	
Laurel	91	37	66.5	2.98	
Longwoods	.....	.....	.....	2.00	
McDonogh	90	39	65.0	3.13	
Mount St. Marys Coll	87	43	66.6	2.11	
Newmarket	88	40	66.0	3.40	
Pocomoke	90	49	70.0	4.37	
Princess Anne	89	45	68.0	4.38	
Queenstown	90	45	68.6	2 61	
Rockhall *b*	89	40	67.0	4.35	
Sharpsburg	94	41	69.6	3.02	
Smithsburg *a*	89	36	65.1	2.72	
Smithsburg *b*	87	42	66.1	3.70	
Solomons	91	52	71.0	2.91	
Sudlersville	93	40	69.8	4.38	
Sunnyside	84	29	58.0	2.85	
Takoma Park	90	42	66 0	3.57	
Taneytown	89	38	65.6	3.78	
Van Bibber	88	44	67.4	4.41	
Westernport	85	37	62.2	2.27	
Woodstock	89	40	67.2	2.03	
Massachusetts.					
Amherst	85	33	61.6	3.67	
Bedford	83	39	62.5	2.41	
Bluehill (summit)	86	39	63.7	4.75	
Cambridge	89	38	64.6	3.78	
Chestnuthill	90	38	65.2	3.28	
Cohasset	.....	.....	.....	3.77	
Concord	89	32	62.6	2.71	
East Templeton *[1]	90	39	61.1	1.90	
Fallriver	84	41	65.1	2.75	
Fitchburg *a* *[1]	86	41	61.7	1.73	
Fitchburg *b*	90	34	63.5	1.63	
Framingham	89	36	64.5	2.96	
Groton	86	30	62.0	2.11	
Hyannis	.....	.....	.....	4.23	
Jefferson	.....	.....	.....	2.94	
Lawrence	93	36	64.2	2.63	
Leominster	.....	.....	.....	2 28	
Lowell *a*	91	35	65.7	3.28	
Lowell *b*	90	34	63.7	.....	
Ludlow Center	86	28	58.4	3.28	
Middleboro	89	32	62.9	3.70	
Monson	85	31	62.2	4.54	
New Bedford *a*	84	40	64.6	3.31	
Pittsfield	88	32	61.8	4.80	
Plymouth *[1]	84	46	64.1	2.77	
Princeton	.....	.....	.....	3.22	
Provincetown	93	46	66.8	3 35	
Somerset *[1]	98	38	67.2	3.58	
Springfield Armory	90	36	64.0	3.10	
Sterling	.....	.....	.....	2.90	
Taunton	88	32	62.3	3.45	
Webster	.....	.....	.....	4.43	
Westboro	89	37	64.2	3.35	
Weston	85	36	62.7	3.20	
Williamstown	83	33	60.0	1.98	
Winchendon	.....	.....	.....	2.65	
Worcester	90	40	64.6	2.94	
Michigan.					
Adrian	90	31	63.6	0.97	
Agricultural College	88	31	61.7	1.67	
Allegan	90[d]	34[d]	61.6[d]	1.06	
Alma	93	31	60.7	1.49	
Ann Arbor	93	35	63.2	1.95	
Annpere	92	28	61.1	1.65	
Arbela	88	31	62.2	2.00	
Baldwin	92	28	62.0	1.90	
Ball Mountain	90	35	62.4	1.92	
Battlecreek	92	32	63.6	1.08	
Bay City	90	34	61.0	0.23	
Benzonia	86	39	59.0	3.89	
Berlin	90*	34[c]	63.7[d]	2.27	
Berrien Springs	93	37	65.0	2.35	
Big Rapids	88	29	59.2	2.10	
Birmingham	93	34	62.6	1.69	
Boon	85	30	55.6	3.15	
Calumet	84	30	54.6	2.55	
Carsonville	91	38	60.5	0.97	
Cassopolis	91	37	65.0	1.55	
Charlevoix	87	41	61.2	1.62	
Chatham	88	30	54.6	5.22	
Cheboygan	89	32	59.6	3.48	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Michigan—Cont'd.	°	°	°	*Ins.*	*Ins*
Clinton	93	32	63.4	1.09	
Coldwater	92	30	62.6	0.73	
Deerpark	87	36	57.2	2.29	
Detour	84	36	58.8	3.02	
Dundee	88	35	63.6	1.03	
Eagle Harbor	90	35	57.0	2.59	
East Tawas	86	33	60.2	2.48	
Eloise	92	35	64.4	1.05	
Ewen	85	25	52.8	2.02	
Fairview	86[f]	34	61.3[e]	1.14	
Fennville	90	38	63.2	2.37	
Fitchburg	90	29	62.4	1.98	
Flint	91	33	62.4	1.75	
Frankfort	75	.....	.....	0.34	
Gaylord	86	32	56.2	4.90	
Grand Marais	87	32	58.4	2.05	
Grand Rapids	91	36	63.2	3.40	
Grape	.....	.....	.....	0.78	
Grayling	91	34	57.6	2.30	
Hanover	93	29	64.1	1.00	
Harbor Beach	88	25	61.6	1.33	
Harrison	88	36	59.3	1.38	
Harrisville	98	33	59.8	3.19	
Hart	89	34	58.4	2.67	
Hastings	92	28	61.7	1.28	T.
Hayes	88	34	61.0	1.18	
Highland Station	.....	.....	.....	2.09	
Hillsdale	90	29	62.8	0.93	
Humboldt	85	20	51.7	4.33	
Ionia	91	30	63.4	1.00	
Iron Mountain[1]	77	30	54.4	1.80	
Ironwood	85	34	56.1	4.47	
Ishpeming	88	26	55.0	2.92	T.
Ivan	87	33	57.2	3.61	
Jackson	95	33	64.4	1.12	
Jeddo	93	35	63.6	1.87	
Kalamazoo	91	47	64.2	0.06	
Lake City	88	36	57.2	.....	
Lansing	89	33	62.3	1.88	
Lapeer	90	34	61.6	1.74	
Lincoln	89	33	59.8	2.44	
Ludington	87	38	57.6	1.16	
Mackinac Island	83	34	57.5	2.53	
Mackinaw	87	41	61.6	3.93	
Madison	89	33	63.8	0.89	
Mancelona	88	35	59.3	5.90	
Manistee	87	40[f]	60.0[e]	3.18	
Manistique	82	33	56.7	2.41	
Menominee	88	30	58.6	2.17	
Midland	90	32	62.6	0.82	
Mio	87	31	58.4	3.07	T.
Mount Pleasant	90	29	62.0	2.90	
Muskegon	86	36	62.2	4.37	
Newberry	88	.....	.....	1.80	
North Marshall	90	30	61.9	1.00	
Old Mission	83	41	59.7	3.86	
Olivet	87	33	61.6	1.25	
Omer	87	28	59.0	1.49	
Onaway	88	30	58.6	4.10	
Ontonagon	87	34	55.4	3.49	
Ovid	89	31	62.2	1.28	
Owosso	92	33	63.8	0.80	
Petoskey	87[b]	42[f]	61.9[b]	1.40	
Plymouth	92	30	63.3	1.70	
Port Austin	89	31	61.1	0.66	
Reed City	90	32	63.2	2.15	
Saginaw	92	33	62.8	0.76	
St. Ignace	83	33	56.6	4.20	
St. Johns	91	35	63.4	1.16	
St. Joseph	88	42	63.2	2.86	
Somerset[c]	90	30	63.0	0.79	
South Haven	85	39	62.0	2.02	
Thomaston	86	26	53.6	2.03	
Thornville	86	38	62.2	2.08	
Traverse City	92	39	61.2	3.75	
Vassar	89	31	61.8	0.92	
Wasepi	90	33	63.1	1.17	
Waverly	90	35	62.0	4.27	
West Branch	88	34	59.2	3.16	
Whitecloud	90	35	61.5	.....	
Whitefish Point	81	39	57.2	2.69	
Ypsilanti	87	33	62.2	1.83	
Minnesota.					
Ada	90	34	54.1	2.74	T.
Albert Lea	91	31	59.4	7.81	
Alexandria	89	30	56.0	2.43	
Ashby	89	33	57.5	2.17	
Beardsley	94	30	57.8	5.26	
Bemidji	87	29	55.6	1.62	
Bird Island	96	32	59.2	2.89	
Blooming Prairie	91	30	58.4	9.35	
Brainerd	86	28	57.4	1.62	
Caledonia	90	32	58.4	9.21	
Campbell	91	38	57.3	2.68	
Collegeville	85	33	57.8	2.61	
Crookston	89	27	55.8	2.32	T.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Minnesota—Cont'd.	°	°	°	*Ins.*	*Ins.*
Currie	84[b]	30[b]	55.8[b]	.....	
Deephaven	.....	.....	.....	4.63	
Detroit City	82[f]	25[e]	55.8[e]	1.75	T.
Faribault	92	32	60.4	7.70	
Farmington	92	31	60.2	5.16	
Fergus Falls	86	30	55.5	2.75	
Glencoe	90	22	55.2	4.10	
Grand Meadow	92	30	59.2	9.24	
Hallock	90	24	52.7	2.19	
Hovland	.....	.....	.....	1.94	
Lake Jennie	92	33	58.2	3.01	
Lake Winnibigoshish	87	32	55.2	1.75	
Leech	87	27	55.0	1.74	
Long Prairie	90	28	57.6	1.87	
Luverne	87	32	58.8	5.53	
Lynd	90	32	58.0	4.11	
Mapleplain	91	34	59.1	5.34	
Milaca	87	27	56.4	3.81	
Milan	89[f]	30[f]	55.6[f]	5.56	
Minneapolis[b1]	88*	34	58.6	4.03	
Montevideo	91	32	58.6	5.39	
Morris	86	35	58.0	3.57	
Mount Iron	88	24	53.5	3.06	T.
Newfolden	86	25	52.2	2.66	
New London	94	32	59.0	3.33	
New Richland*[1]	94	38	59.8	.....	
New Ulm	91	34	58.8	5.85	
Park Rapids	87	24	53.4	1.24	
Pine River	87	28	55.6	1.31	
Pipestone	85	31	57.4	4.59	
Pleasant Mounds	90	32	60.6	6.56	
Pokegama Falls	88	20	53.3	1.31	
Redwing *a*	.....	.....	.....	7.28	
Redwing *b*	91	33	61.5	5.86	
Reeds	.....	.....	.....	5.96	
Rolling Green	88	34	59.1	7.02	
St. Charles	93	31	59.5	9.76	
St. Cloud	92	32	60.2	3.25	
St. Peter	94	31	58.6	9.28	
Sandy Lake Dam	85	24	55.7	0.51	
Shakopee	91	33	59.8	4.79	
Tower	85	25	51.6	2.20	T.
Two Harbors	86	28	54.2	2.21	
Wabasha*[3]	.....	38	58.0	6.86	
Warroad	87[b]	26[b]	52.9[b]	2.58	
Willmar	88	32	56.2[e]	4.53	
Willow River	88	25	57.0	2.21	
Winnebago City	92	31	59.2	7.17	
Worthington	86	32	57.8	6.84	
Wyoming	.....	.....	.....	6.17	
Zumbrota[1]	93*	29	60.2	.....	
Mississippi.					
Aberdeen	94	36	69.6	2.95	
Agricultural College	94	43	72.8	2.35	
Austin	91	40	71.2	9.78	
Batesville	91	38	69.8	4.82	
Bay St. Louis	91	56	77.7	1.58	
Biloxi	92	54	77.8	4.17	
Booneville	88	44	70.4	4.27	
Brookhaven	96	44	74.8	3.85	
Canton	95	42	72.5	4.53	
Cleveland	96	41	72.5	5.00	
Columbus *a*	.....	.....	.....	2.61	
Columbus *b*	91	44	71.8	2.61	
Corinth	92	41	70.7	6.76	
Crystalsprings	98	43	74.0	2.16	
Edwards	95	47	75.2	3.84	
Fayette	92	48	73.8	3.25	
Fayette (near)*[1]	91	51	75.6	3.39	
Greenville *a*	88	45	74.6	4.59	
Greenville *b*	94	45	74.1	4.75	
Hattiesburg	96	49	75.9	2.15	
Hazlehurst	95	53	76.0	1.19	
Hernando	92	43	71.8	4.50	
Holly Springs	90	42	71.0	8.85	
Indianola	90	43	71.8	4.82	
Jackson	95	46	75.0	1.79	
Lake	92	43	71.8	4.00	
Leakesville	98	49	77.0	2.45	
Louisville	91	42	72.2	3.79	
Macon	92	41	71.6	1.62	
Magnolia	94	45	74.4	3.77	
Natchez	95	48	75.8	1.40	
Okolona	99	39	70.2	.....	
Palo Alto	91	44	72.8	2.71	
Pearlington	94	51	76.2	1.68	
Pittsboro	96	40	71.8	3.58	
Pontotoc	88	40	71.0	3.85	
Poplarville[b]	95	52	75.6	2.00	
Port Gibson	96	45	74.5	2.37	
Ripley	89	40	69.4	6.49	
Saratoga	95	43	73.9	2.50	
Shoccoe	.....	.....	.....	4.16	
Stonington*[1]	92	48	74.4	2.88	
Suffolk	93	44	73.2	6.37	
Swartwout	97	50	76.4	2.70	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Mississippi—Cont'd.	°	°	°	*Ins.*	*Ins.*
Thornton	92	44	74.6	5.80	
Tupelo	.....	.....	.....	3.45	
Walnutgrove	93[f]	41[f]	71.8[f]	1.21	
Watervalley	95	43	72.8	5.23	
Waynesboro	96	50	76.8	1.95	
Windham	102	43	74.2	.....	
Woodville	92	45	74.5	4.62	
Yazoo City	95	44	73.0	3.55	
Missouri.					
Appleton City	100	38	69.4	7.31	
Arthur	95	35	67.4	4.05	
Avalon	98	34	69.5	1.92	
Bethany	97	29	65.4	4.42	
Birchtree	94	33	69.4	0.92	
Boonville	.....	.....	.....	2.54	
Brunswick	93	37	67.4	2.04	
Conception	91	33	67.4	1.85[b]	
Cook Station	103	30	68.6	0.11	
Dean	97	34	70.6	3.55	
Desoto	99	31	70.5	2.54	
Downing	.....	.....	.....	2.90	
Edgehill*[5]	94	34	68.0	1.32	
Edwards[b]	94	23	67.0	2.11	
Eightmile*[5]	.....	44	70.1	4.51	
Eldon	97	32	69.0	1.09	
Fairport	.....	.....	.....	5.31	
Fayette	96	35	68.5	1.55	
Fulton	96	34	68.4	1.75	
Galena	.....	.....	.....	2.23	
Gallatin*[1]	98	36	68.0	5.01	
Gayoso	91	36	69.1	2.60	
Glasgow	96	36	69.0	1.20	
Gorin	.....	.....	.....	2.20	
Halfway	96	36	69.4	4.34	
Harrisonville	98	35	67.8	3.80	
Hazlehurst	.....	.....	.....	3.96	
Hermann	.....	.....	.....	1.01	
Houston	97	31	70.0	1.07	
Irena	.....	.....	.....	3.47	
Ironton	99	27	68.4	1.26	
Jackson	93	31	68.6	1.05	
Jefferson City	98	33	70.4	0.95	
Kidder	94	31	67.0	3.50	
Koshkonong	96	39	72.2	0.20	
Lamar	98	38	71.1	4.90	
Lawonte	.....	.....	.....	2.63	
Lebanon	.....	.....	.....	2.35	
Lexington	99	33	69.1	2.68	
Liberty	98	34	68.6	1.75	
McCune*[1]	96	38	69.4	0.55	
Macon	97	34	68.6	2.65	
Marblehill	96	30	69.0	1.40	
Marshall	97	34	68.7	1.59	
Maryville	97	30	64.4	3.76	
Mexico	100	34	70.6	0.68	
Miami*[5]	94	36	68.9	1.05	
Mineralspring	97	36	70.6	1.08	
Monroe City	93	33	66.4	2.18	
Montreal	99	30	68.4	1.37	
Mountaingrove	94	37	69.0	0.72	
Mount Vernon	100	35	72.7	1.07	
Neosho	94	34	69.3	4.41	
Nevada	.....	.....	.....	3.54	
New Haven	97	35	70.4	0.76	
New Madrid *b*	.....	.....	.....	2.98	
New Palestine	97[f]	40[f]	73.9[f]	2.05	
Oakfield	97	34	71.4	0.72	
Olden	95	37	70.6	0.96	
Oregon *a*	93	35	67.6	2.85	
Palmyra*[5]	93	36	67.8	2.60	
Phillipsburg*[1]	96	36	67.6	2.11	
Pine Hill	.....	.....	.....	0.99	
Poplarbluff	99	34	70.4	1.28	
Potosi	98	27	67.6	0.74	
Princeton	98	33	67.6	4.08	
Richmond	94	37	68.6	1.89	
Rockport	.....	.....	.....	2.85	
Rolla	.....	.....	.....	0.92	
St. Charles	98	33	70.0	1.00	
St. Joseph	.....	.....	.....	2.16	
Sarcoxie*[4]	.....	44	67.8	1.56	
Sedalia	95	33	68.4	2.81	
Seymour	93	32	68.8	0.73	
Shelbina	.....	.....	.....	3.25	
Sikeston	94	34	69.5	1.96	
Steffenville	97	35	69.0	3.00	
Sublett	98	32	66.4	2.59	
Trenton	93	35	66.8	3.62	
Unionville	100	34	68.6	3.68	
Vichy	100	34	70.6	2.32	
Warrensburg	97	34	68.2	2.40	
Warrenton	99	34	70.8	0.74	
Wheatland	.....	.....	.....	4.28	
Willowsprings	93	34	65.8	1.77	
Windsor	97	34	68.5	4.63	
Zeitonia	98	30	69.0	1.47	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Montana.	°	°	°	*Ins*	*Ins.*
Adel	75	18	49.8	3.51	4.0
Augusta	80	26	46.0	4.30	7.0
Billings	97	30	53.2	.....	.
Boulder	82	24	47.6	1 36	T.
Butte	77	24	45.8	0.90	
Canyon Ferry	89	30	52.5	2.63	
Chester	89	21	51.0	1.11	1.0
Columbia Falls	85	27	49.1	3.68	
Corvallis	.....	.....	.....	2.00	
Culbertson	99	28	53.0	1.96	
Deerlodge	97°	24	51.9°	3.00	
Dell	81	22	47.2	1.30	6.0
Dillon	80	27	50.6	4.77	T.
Ekalaka	95	22	55.4	1.64	T.
Fort Benton	82	30	50.0	1.68	
Fort Logan	83	24	47.3	2.43	0.5
Glasgow	90	24	53.6	2.13	
Glenwood	88	25	49.7	1.76	
Greatfalls	89	30	51.8	1.89	4.8
Glendive	103	24°	53.7	2.24	T.
Kipp	75	21	43.9	1.98	9.2
Lewistown	89	25	49.4	1.30	
Livingston	94	28	53.8	2.10	T.
Manhattan	87	22	51.1	0.63	
Martinsdale	89	24	47.8	2.40	5.0
Marysville	80	28	45.2	2.97	3.0
Missoula [1]	74	31	51.3	0.55	
Ovando	86	19	45.8	1.82	T.
Parrot	87	28	51.2	1.84	
Plains	76	29	50.2	1.92	
Poplar	97	26	51.9	2.69	
Ridgelawn	101	22	52.6	2.97	
St. Pauls	85	23	49.2	2.73	2.0
Troy	77	30	51.8	2.76	
Twin Bridges	73°	23°	47.3°	.....	
Utica	93	26	50.9	2.42	0.5
Yale	85	15	47.2	1.61	
Nebraska.					
Agate	.....	.....	.....	0 70	
Agee *1	92	30	59.3	5.75	
Albion	88	27	62.3	7 25	
Alliance	89	31	60.0	0.70	
Alma	94	32	67 5	4.20	
Ansley	89	21	59.8	4.10	
Arapahoe *1	90	32	64.6	3.33	
Arborville *1	92	32	62.2	7.02	
Arcadia	.....	.....	.....	7.70	
Arlington	.....	.....	.....	8.05	
Ashland *a*	96	29	66.0	5.29	
Ashton	.....	.....	.....	6.72	
Auburn	96	27	66.3	2.29	
Aurora	93	30	64.2	7.28	
Bartley	.....	.....	.....	8.40	
Beatrice	95	28	67.0	1.75	
Beaver	95	31	65.2	3.57	
Bellevue	.....	.....	.....	4.35	
Benedict	.....	.....	.....	7.46	
Benkleman	.....	.....	....	8.70	
Blair	93	30	62.8	7.41	
Bluehill *1	90	32	65.3	4.58	
Bradshaw	.....	.....	.....	9.61	
Brokenbow	91	25	61.9	4.83	
Burchard	.....	.....	.....	3.30	
Burwell	.....	.....	.....	9.08	
Callaway	90	27	61.6	6.65	
Camp Clarke	85	29	60.4	2.70	
Central City	.....	.....	.....	5.68	
Chester	.....	.....	.....	3.21	
Columbus	89	28	63.2	6.03	
Crete	93	30	66.6	4.82	
Cuibertson	.....	.....	.....	4.13	
Curtis	91f	31f	63.3f	4.44	
Dannebrog	.....	.....	.....	4.86	
David City	90	28	63.0	5.20	
Dawson	95	31	68.2	2.31	
Eden	.....	.....	.....	2.97	
Edgar *a* *5	92	38	66.6	3.12	
Ericson	.....	.....	.....	6.53	
Ewing	.....	.....	.....	8.28	
Fairbury	97	29	64.8	2.87	
Fairmont	93	29	63.1	5.08	
Fort Robinson	86	26	58.0	1.44	T.
Franklin	97	30	65 6	4.70	
Fremont	93	28	63.2	7.59	
Geneva	96	28	64.8	3.11	
Genoa	92	29	63 8	7.63	
Gering	88	31	59.4	2 32	
Gordon	.....	.....	.....	0.25	
Gosper	.....	.....	.....	4.78	
Gothenburg	91	25	62.2	5.50	
Grand Island *a* *1	87	36	62.3	6.84	
Grand Island *b*	91	29	65.2	8.35	
Grand Island *c*	92	29	63.5	7.05	
Greeley	.....	.....	.....	5.58	
Guide Rock	.....	.....	.....	3.92	
Haigler	.....	.....	.....	1.80	
Hartington	91	28	60.8	10.97	
Harvard	92	30	61.4	4.80	
Hastings *1	90	32	64.4	6.87	
Hayes Center	.....	.....	....	3.42	
Hay Springs	85	25	57.7	0.85	T.
Hebron	95	30	66.0	2.74	
Hickman	.....	....	.....	3.11	
Holbrook	.....	.....	.....	3.22	
Holdrege	89	31	63.4	4.21	
Hooper *1	89	28	62.2	6.77	
Imperial	90	33	62.4	1.83	
Johnstown	.....	.....	.....	4.46	
Kearney	91	31	63.6	6.32	
Kennedy	91	32	63.0	6.99	
Kimball	83	32	58.6	1.38	
Kirkwood *1	90	34	58.6	6.68	
Laclede	92	28	63.6	7.50	
Lexington	90	29	61.4	5.64	
Lodgepole	87	29	60.1	1.25	
Loup	.....	.....	.....	7.67	
Lynch	95	30	61.3	4.86	
Lyons	.....	.....	.....	6.07	
McCook	.....	.....	.....	4.53	
McCool	.....	.....	.....	4.62	
Madison	88	28	62.3	5.71	
Madrid	.....	.....	.....	1.07	
Marquette	.....	.....	.....	5.89	
Mason City	.....	.....	.....	5.59	
Minden *a*	91	30	64.0	7.67	
Monroe	.....	.....	.....	6.89	
Nebraska City *b* *1	92	38	66.4	4.10	
Nebraska City *c*	94d	30d	65.2d	5.08	
Nemaha *1	98	34	68.0	2.10	
Nesbit	88	25	59.4	3.11	
Norfolk	90	24	61.2	3.52	
North Loup	94	25	63.5	5.84	
Oakdale	90	25	61.6	6.83	
Odell	.....	.....	.....	2.38	
O'Neill	92	23	61.3	7.51	
Ord	.....	.....	.....	5.92	
Osceola	.....	.....	.....	6.56	
Ough	...	.....	.....	1.84	
Palmer	....	.....	.....	7.11	
Palmyra *1	94	32	64.7	3.73	
Pleasanthill	.....	.....	.....	3.92	
Ravenna *a*	91	28	64.0	6.76	
Ravenna *b*	.....	.....	.....	7.28	
Redcloud *b*	96	30	66.0	4.28	
Republican *1	90	36	63.2	6.74	
Ruio	.....	.....	.....	2.21	
St. Libory	.....	.....	.....	5.93	
St. Paul	91	27	64.4	5.71	
Salem *1	91	38	67.9	2.81	
Santee	93	28	63.6	7.04	
Schuyler	.....	.....	.....	5.51	
Seneca *1	86	29	55.1	1.16	
Seward	93	29	63.0	8.32	
Smithfield	.....	.....	.....	4.88	
Spragg	.....	.....	.....	6.45	
Springview	86	21	58.9	5.21	
Stanton	89	27	62.4	5.31	
State Farm	97	29	66.4	6.36	
Strang	.....	.....	.....	3.87	
Stratton	.....	.....	.....	3.05	
Superior	92	30	64.8	1.95	
Syracuse	.....	.....	.....	3.25	
Tablerock	.....	.....	.....	2.85	
Tecumseh *b*	95	25	65.9	1.15	
Tecumseh *c*	.....	.....	.....	1.60	
Tekamah	94	31	64.0	10 16	
Turlington	93	28	66.0	2.51	
Wakefield	90	25	61.0	8.60	
Wallace	.....	.....	.....	2.45	
Wauneta	.....	.....	.....	2.30	
Weeping Water	.....	.....	.....	5.22	
Westpoint	96	30	64.6	4.85	
Whitman	.....	.....	.....	1.50	
Wilber *1	94	36	66.3	2.50	
Willard	.....	.....	.....	2.98	
Wilsonville	.....	.....	.....	3.92	
Winnebago	.....	.....	.....	5.83	
Wisner	.....	.....	.....	7.22	
Wymore	.....	.....	.....	2.17	
York	92	28	64.7	8.19	
Nevada.					
Amos	83	23	51.8	0.19	
Austin	78	30	56.5	0 22	
Battle Mountain *1	90	32	59 9	0.68	
Belmont	89	29	55.6	0.08	
Beowawe *1	93	45	63 4	0.00	
Carlin *1	85	28	64.5	0.00	
Carson City	90	29	57.4	0 47	T.
Cranes Ranch	.....	.....	.....	0 45	
El o	88	32	54.4	0 00	
Elko (near)	78	22	49.2	T.	
Ely	84	25	54.8	0.50	3.0
***Nevada*—Cont'd.**					
Fenelon *1	82	31	55.9	0.10	1.0
Golconda *1	84	48	63.6	0.00	
Halleck *1	90	34	55.2	0.25	
Hamilton	73	20	46.4	1.20	12.0
Hawthorne	92	38	64.3	0.00	,
Hot Springs *1	90	52	72.2	T.	
Humboldt *1	83	40	65.1	0.40	4.0
Lee	.....	.....	.....	0.60	
Lewers Ranch	88	32	58.4	1.38	0.3
Lovelocks *a* *1	92	30	59.2	0.12	
Lovelocks *b*	90	38	62.8	.....	
Martins	93	29	59.4	0.29	
Mill City *1	90	35	59.6	0.40	
Owyhee	85	24	53.0	0.24	T.
Palisade *1	83	29	56.2	T.	
Palmetto	88	22	56.7	0.03	T
Potts	86	28	56.0	0.75	5.0
Reno State University	88	33	58.0	0.09	
Sodaville	94	31	64.6	0.00	
Tecoma *1	95	45	65.3	T.	
Toano *5	80	40	63.2	0.07	
Tybo	85	31	59.4	0.15	
Verdi *5	74	33	53.4	0.10	
Wadsworth *1	95	45	70.1	0.00	
Wells *1	80	40	56.6	T.	
New Hampshire.					
Alstead	85	30	60.0	3.34	
Berlin Mills	90	24	58.5	2.08	
Bethlehem	82	30	57.4	2.79	
Brookline *1	92	30	61.8	2.50	
Chatham	89	30	59.4	1.80	
Concord	87	27	60.6	3.08	
Durham	89	38	62.6	3.38	
Franklin Falls	84	31	60.4	3.27	
Grafton	89	23	57.8	4.26	
Hanover	91	28	60.0	3.53	
Keene	90	27	59.8	3.31	
Littleton	86	28	57.5	1.73	
Nashua	92	30	63.5	2.02	
Newton	89	28	61.6	4.06	
Peterboro	89	25	59.8	2.36	
Plymouth	88	26	59.2	2.42	
Sanbornton	89	29	59.7	3.17	
Stratford	91	26	57.8	2.74	
New Jersey.					
Asbury Park	84	48	68.4	4.47	
Bayonne	90	43	68.6	1.99	
Belvidere	91	37	66.5	2.66	
Bergen Point	88	45	66.9	2.17	
Beverly	92	43	68.4	3.72	
Blairstown	92	33	65.2	5.08	
Bridgeton	93	42	69.4	4.70	
Camden	88	45	68.3	4.94	
Cape May C. H.	88	42	68.7	3.75	
Charlotteburg	84	29	62.2	3.94	
Chester	89	39	64 1	3.37	
Clayton	90	41	67.8	5.58	
College Farm	90	41	67.6	1.86	
Dover	90	33	63.2	4.02	
Egg Harbor City	87	41	66.8	6.20	
Elizabeth	89	43	67.0	2.67	
Flemington	92	40	67.4	3.65	
Freehold	87	41	65.8	3.29	
Friesburg	90	39	67.8	3.01	
Hanover	86	32	64.0	2.30	
Hightstown	88	43	67.2	3.76	
Imlaystown	90	43	68.6	3 80	
Indian Mills	94	40	68.6	4.92	
Lakewood	89	42	66.4	3.11	
Lambertville	91	38	68.3	3.60	
Layton	90	29	63.4	3.68	
Moorestown	90	42	67.8	3.21	
Mount Pleasant	.....	.....	.....	3.60	
Newark	90	41	66.2	1.63	
New Brunswick	91	43	68.2	2 28	
New Egypt	....	.....	.....	2.51	
Newton	91	35	64 8	4.95	
Oceanic	83	48	66.6	3.28	
Paterson	90	42	67.0	2.48	
Perth Amboy	88	45	67.3	5 46	
Plainfield	90	40	66.6	3.47	
Rancocas	.....	.....	.....	3.02	
Rivervale	88	37	64 6	2.90	
Roseland	91	33	64 0	1.92	
Salem	92	41	69 0	2.95	
Somerville	90	38	66.9	2.18	
South Orange	87	43	65.5	1.91	
Sussex	86	36	64.0	3.77	
Three Bridges	.....	.....	.....	3 23	
Trenton	88	46	68 4	4.13	
Tuckerton	88	40	67 6	3.83	
Vineland	93	43	67.7	2 43	
Woodbine	90	40	67.1	6.82	
Woodstown	.....	.....	.....	3.39	
New Mexico.					
Alamagordo	98	48	72.8	1.18	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New Mexico—Cont'd.	°	°	°	*Ins.*	*Ins.*
Albert	91	41	68.4	1.83	
Albuquerque	90	42	66.8	1.31	
Alma	92	37	66.6	1.75	
Aztec	90	26	64.0	0.14	
Bellranch	.....	.....	.....	0.86	
Bluewater	86	26	60.9	0.55	
Cambray	.....	.....	.....	0.37	
Carlsbad	100	.....	.....	1.11	
Deming	.....	.....	.....	0.05	
East Lasvegas	76	43	60.2	2.00	
Engle	92	44	70.6	T.	
Folsom	79	32	60.0	3.80	
Fort Bayard	90	45	68.0	1.00	
Fort Stanton	84[d]	38[d]	61.1[d]	2.00	
Fort Union	84	33	60.0	2.10	
Fort Wingate	90	35	65.0	0.21	
Gage	.....	.....	.....	0.30	
Gallisteo	89	39	62.2	2.60	
Gallinas Spring	89	44	64.8	1.52	
Horse Springs	86	34	62.4	0.35	
Las Vegas	85	31	60.8	2.33	
Las Vegas Hotsprings	83	36	60.4	2.94	
Lordsburg	.....	.....	.....	0.00	
Los Lunas	94	38	66.8	3.60	
Lower Penasco	89	41	67.7	3.90	
Mesilla Park	100	43	73.2	1.25	
Ollo	89	28	60.2	T.	
Raton	85	34	60.2	0.50	
Roswell	97	40	70.2	1.99	
San Marcial	100	45	73.1	0.10	
Socorro	93	45	72.0	2.25	
Springer	90	28	62.3	0.59	
Strauss	.....	.....	.....	1.44	
Woodbury	89	39	65.2	0.84	
New York.					
Adams	.....	.....	.....	4.29	
Addison	88	34	62.0	2.55	
Adirondack Lodge	81	28	55.1	4.17	
Akron	.....	.....	.....	3.89	
Alden	84	40	63.3	4.06	
Angelica	86	30	59.4	3.11	
Appleton	87	40	63.0	2.77	
Atlanta	88	33	61.0	2.58	
Auburn	90	36	64.5	1.95	
Avon	86	33	61.4	2.63	
Axton	88[d]	19[j]	53.4[d]	4.11	
Baldwinsville	86	37	63.3	3.32	
Bedford *a*	89	40	64.8	5.41	
Blue Mountain Lake	.....	.....	.....	2.80	
Bolivar	87	29	59.4	3.77	
Bouckville	83	32	60.2	2.30	
Boyds Corners	.....	.....	.....	4.68	
Brockport	86	38	62.9	3.39	
Caldwell	85	33	60.4	3.05	
Canaan Four Corners	84	34	60.2	3.77	
Canajoharie	84	32	61.1	2.76	
Canton	85	31	59.2	4.98	
Carmel	86	38	64.4	5.81	
Carvers Falls	88	30	60.7	2.44	
Catskill	85	36	64.0	2.60	
Cedarhill	90	31	63.4	3.36	
Chenango Forks	.....	.....	.....	1.93	
Cherry Creek	.....	.....	.....	4.91	
Cooperstown	81	32	59.1	3.08	
Cortland	.....	.....	.....	2.90	
Cutchogue	89	43	66.0	6.03	
Dekalb Junction	.....	.....	.....	3.72	
Easton	.....	.....	.....	4.42	
Elba	88	37	63.0	3.26	
Elmira	86	36	63.2	2.86	
Fayetteville	88	34	63.8	3.43	
Franklinville	86	30	59.5	3.53	
Fulton	.....	.....	.....	3.52	
Gabriels	82	26	56.5	3.24	
Glens Falls	86	36	62.4	2.78	
Gloversville	88	30	60.0	3.86	
Greenwich	87	31	62.5	2.96	
Griffin Corners	88	25	59.6	4.10	
Haskinville	.....	.....	.....	2.66	
Hemlock	82	38	63.1	3.34	
Honeymead Brook	84	33	62.1	3.76	
Honnedaga Lake	.....	.....	.....	1.42	
Humphrey	85	35	58.6	5.10	
Indian Lake	.....	.....	.....	4.59	
Ithaca	85	35	61.8	1.66	
Jay	89	24	59 9	2.82	
Keene Valley	86	25	58.2	2.35	
King Ferry	.....	.....	.....	2.16	
King Station	.....	.....	.....	4.82	
Littlefalls, City Res	86	34	61.0	3.59	
Lockport	89	40	65 4	2.47	
Lowville	85	29	59.4	4.14	
Lyndonville	.....	.....	.....	4.02	
Lyons	90[c]	36[b]	63.4[c]	1.38	
Mayle	.....	.....	.....	2.55	
Meredith	81	30	59.0	4.60	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New York—Cont'd.	°	°	°	*Ins.*	*Ins.*
Middletown	84	39	64.0	4.52	
Mohonk Lake	80	36	60.6	3.81	
Moira	87	29	61.2	5.32	
Newark Valley	.....	.....	.....	2.70	
New Lisbon	84	27	57.2	3.60	
North Hammond	84	36	60.9	3.30	
Number Four	87	30	56.6	5.85	
Ogdensburg	86	36	61.0	2.94	
Old Chatham	.....	.....	.....	3.26	
Oneonta	89	30	60.5	3.34	
Oxford	84	28	59.2	3.61	
Palermo	85	34	61.1	2.95	
Penn Yan	87[b]	36[c]	62 6[c]	2.09	
Perry City	82	29	59.6	2.22	
Plattsburg Barracks	87	32	61.0	3.80	
Port Byron	82	35	61.7	2.87	
Port Jervis	90	32	64.4	5.52	
Primrose	89	40	64.9	3.01	
Redhook	.....	.....	.....	2.30	
Richmondville	88	31	61.0	3.24	
Ridgeway	86	39	63.5	3.28	
Rome	82	35	58.2	4.62	
Romulus	87	37	62.8	2.46	
Salisbury Mills	.....	.....	.....	4.63	
Saranac Lake (near)	86	24	57.2	3.55	
Saratoga Springs	91	36	62.9	4.39	
Schenectady	93	33	66.6	4.21	
Scottsville	.....	.....	.....	3.29	
Setauket	83	45	65.6	3.55	
Shortsville	84	37	62.7	2.35	
Skaneateles	.....	.....	.....	2.38	
Southampton	82	41	65.3	4.10	
South Berlin	.....	.....	.....	2.30	
South Canisteo	83	32	59.7	3.24	
Southeast Reservoir	.....	.....	.....	5.88	
South Kortright	86	28	60.0	4.25	
South Schroon	85	26	57.5	4.07	
Straits Corners[d]	82	30	57.2	.....	
Ticonderoga	86	34	63.0	1.94	
Volusia	83	38	61.0	6.31	
Walton	91	30	60.3	3.33	
Wappingers Falls	84	37	64.4	3.28	
Warwick	.....	.....	.....	3.48	
Watertown	82	35	62.0	3.80	
Waverly	89	32	62.2	2.59	
Wedgwood	83	37	61.1	2.46	
Wells	89	25	58.8	3.77	
West Berne	90	28	60.0	2.61	
West Chazy	86	28	60.2	.....	
Westfield *a*	81	37	63.2	4.51	
Westfield *b*	82	40	62.2	4.53	
Westfield *c*	81	43	63.8	3.79	
Windham	86	28	60.7	3.55	
North Carolina.					
Abshers	92	39	67.6	4.87	
Asheville	.....	.....	.....	3.78	
Biltmore	81	36	63.2	2 53	
Bryson City	.....	.....	.....	2.86	
Chapelhill	92[c]	49[c]	70.6[c]	4.75	
Cherryville	90	43	68.8	6.72	
Currituck	.....	.....	.....	6.20	
Fayetteville	94	50	72.6	5.47	
Flatrock	84	35	63.6	7.24	
Goldsboro	92	52	72.3	6.83	
Greensboro	90	48	68.8	3.50	
Henderson	92	48	70.5	7.84	
Hendersonville	85	37	65.2	5.78	
Henrietta	90	45	70.4	7.21	
Highlands	75	36	58.9	4.47	
Horse Cove	80	40	64.0	6.10	
Kinston	96	50	73.7	7.57	
Lenoir	90	40	66.8	3.86	
Linville	76	31	57.8	5.82	
Littleton	95	46	70.5	3.75	
Louisburg	90	48	71.1	6.94	
Lumberton	92	54	74.0	9.38	
Marshall	86[c]	38[c]	64.0[c]	3.32	
Mocksville	90	44	68.6	2.89	
Moncure	90	51	70.2	5.78	
Monroe	91	41	69.3	6.24	
Morganton	87	40	67.4	4.10	
Mountairy	88	40	66.6	3.82	
Murphy	.....	.....	.....	4.24	
Newbern	94	54	74.1	7.04	
Oakridge	92	43	68.2	2.29	
Patterson[*1]	82	40	62.6	4.60	
Pittsboro	95	45	70.6	7.86	
Redsprings	95	51	73.4	4.43	
Rockingham	94	49	72.2	7.41	
Roxboro	91	46	69.0	5 50	
Salem	89	45	69.0	2.82	
Salisbury	94	43	71.0	3.32	
Saxon	90	43	69.1	3.85	
Selma	93	49	72.1	8.01	
Settle	89	47	69.4	3.53	
Sloan	95	50	73.6	7.20	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
North Carolina—Cont'd	°	°	°	*Ins.*	*Ins.*
Soapstone Mount	91	43	67.4	4.49	
Southern Pines *a*	98	48	74.0	9.59	
Southern Pines *b*	93	50	72.2	9.30	
Southport	90	56	76.2	4.87	
Tarboro	95[c]	50[c]	74.5[c]	8.24	
Waynesville	82	33	61.8	2.31	
Weldon *a*	90	51	70.4	6.92	
Weldon *b*	.....	.....	.....	6.86	
North Dakota.					
Amenia	92	21	55.6	1.31	T.
Ashley	90	15	52.9	0.03	
Berlin	92	18	53.4	1.37	T.
Buxton	86	22	53.8	1.50	T.
Cando	91[c]	16[c]	50.4[c]	1.87	
Churchs Ferry	92	20	51.8	1.71	
Coalharbor	92	21	52.5	2.00	T.
Devils Lake	89	24	53.6	2.55	
Dickinson	98	20	54.4	0.83	T.
Dunseith	89	12	50.2	2.23	
Edgeley	93	22	56.2	1.41	
Ellendale	92	22	56.7	1.70	
Falconer	94	23	54.4	1.81	T.
Fargo	92	23	54.8	2.57	
Forman	93	24	56.1	5.66	
Fort Berthold	99	24	54.8	1.43	T.
Fort Yates	94	20	56.8	0.54	
Fullerton	91	23	54.6	1.85	T.
Gallatin	85	12	51.3	0.84	T.
Grafton	89	26	53.2	0 92	
Hamilton	93[f]	25[g]	51.2[g]	1.96	
Hannaford	90	20	53.4	1.32	
Jamestown	89	22	52.7	2.27	
Langdon	87	20	50.4	2.31	
Larimore	91	19	50.4	1.04	
Lisbon	95	23	55.4	3.32	
McKinney	95	21	49.6	3.31	T.
Mayville	90	25	55.0	2.11	
Medora	100	24	53.4	1.15	
Melville	90	22	53.4	0.53	
Milton	89	22	50.0	2.30	T.
Minto	90[b]	21	53.0[d]	1.71	
Napoleon	94	22	53.8	0.72	
New England	96	20	54.2	1.95	T.
Oakdale	92	24	51.2	1.70	T.
Pembina	90	25	51.2	2.59	
Power	92	23	56.4	3.01	
Steele	94	20	53.4	2.41	T.
University	88	25	53.2	1.55	
Wahpeton	91	32	56.5	3.93	
Willow City	92	16	50.5	2.41	
Woodbridge	87	19	50.2	6.07	T.
Ohio.					
Akron	85	42	63.6	4.98	
Annapolis	82	38	61.3	4.25	
Atwater	.....	.....	.....	4.53	
Bangorville	87	36	64.6	4.25	
Bellefontaine	85	38	64.0	1.93	
Bement	.....	.....	.....	3.07	
Benton Ridge	89	34	65.2	1.82	
Bethany	93	37	68.2	2.30	
Bigprairie	87	36	64.0	6.91	
Binola	.....	.....	.....	6.26	
Bloomingburg	92	37	66.2	1.72	
Bowling Green	89	32	64.2	1.32	
Bucyrus	92	34	65.5	1.82	
Cambridge	90	35	64.0	2.79	
Camp Dennison	93	32	67.0	0.90	
Canaan	.....	.....	.....	5.17	
Canal Dover	87	35	63.2	4.11	
Canton	86	38	63.7	4.12	
Cardington	88	31	64.2	3.78	
Cedarville	.....	.....	.....	2.73	
Celina	95	29	65.0	1.95	
Chillicothe	96	36	67.6	2.38	
Circleville	90	38	66.5	3.51	
Clarksville	92	37	67.2	1.22	
Cleveland *a*	80	47	63.8	7.05	
Cleveland *b*	83	46	63.8	5.78	
Clifton	92	35	66.0	2.70	
Coalton	90	33	65.3	1.45	
Colebrook	84	34	62.2	3.99	
Dayton *a*	.....	.....	.....	2.54	
Dayton *b*	95	34	66.7	2.32	
Defiance	94	32	64.4	1.54	T.
Delaware	89	35	64.6	3.42	
Demos	84	38	64.2	2.37	
Elyria	86	39	63.6	2.34	
Findlay	93	35	66.4	1.85	
Frankfort	87	35	64.0	1.98	
Fremont	86	40	64.5	1.17	
Garrettsville	87	37	62.2	4.41	
Granville	87[c]	35[c]	63.4[c]	3.41	
Gratiot	84	38	64.2	2.36	
Green	87	39	67.4	4.15	
Greenfield	86	38	65.4	1.62	
Greenhill	85	34	61.9	4.95	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins.*
Greenville	87	38	65.1	1.61	
Hanging Rock	91	38	66.9	5.30	
Hedges	93	30	65.9	1.76	
Hillhouse	84	35	61.1	5.51	
Hillsboro	90	35	64.8	0.69	
Hiram	84	41	63.0	4.37	
Hudson	87	38	63.0	4.05	
Jacksonboro	98	38	69.3	3.25	
Killbuck	86	37	63.3	3.02	
Lancaster	87	37	64.5	2.32	
Lima	.....	.....	.....	1.65	
McConnelsville	90	37	64.6	1.83	
Manara	.....	.....	.....	1.51	
Mansfield	.....	.....	.....	5.60	
Marietta	88	42	66.0	1.92	
Marion	93	34	66.4	4.24	
Medina	90	38	64.6	3.67	
Milfordton	88	34	65.3	3 19	
Milligan	90	33	64.0	2.16	
Millport	85	35	61.3	3.77	
Montpelier	88	32	63.2	0.82	
Moorefield	87	34	64.6	2.94	
Napoleon	92	35	65.0	0.64	
New Alexandria	91	39	64.6	2.30	
New Berlin	89	37	64.2	5.06	
New Bremen	92	32	66.0	1.44	
New Lexington	.....	.....	.....	2.11	
New Paris	90	34	65.0	0.53	
New Richmond	94	38	69.2	1.26	
New Waterford	86	38	63.0	3.85	
North Lewisburg	90	35	64.3	2.45	
North Royalton	87	40	63.8	4.55	
Norwalk	89	37	64.8	2.35	
Oberlin	88	38	64.7	1.57	
Ohio State University	91	36	64.4	2.39	
Orangeville	87	35	61.8	4.85	
Ottawa	93	32	65.8	1.61	
Pataskala	88	35	63.9	3.33	
Philo	90	37	66.2	1.66	
Plattsburg	93	34	65.4	2.78	
Pomeroy	90	38	65.2	1.76	
Portsmouth *a*	.....	.....	.....	3.38	
Portsmouth *b*	91	41	67.6	3 32	
Pulse	.....	.....	.....	0.94	
Red Lion	.....	.....	.....	1.64	
Richfield	.....	.....	.....	4.77	
Richwood	92	34	65.2	2.43	
Ripley	90	38	66.9	1.77	
Rittman	85	33	62.7	4.73	
Rock	.....	.....	.....	4.40	
Rockyridge	90	35	65.8	1.18	
Rosewood	90	34	64.0	2.02	
Shenandoah	86	34	62.6	4.25	
Sidney	93	33	65.5	2.14	
Sinking Spring	94	36	67.1	1.95	
Somerset	90	40	66 0	2.04	
Springfield	.....	.....	.....	2.44	
Strongsville	.....	.....	.....	5.51	
Swanton	.....	.....	.....	1.32	
Thurman	93	37	67.2	1.85	
Tiffin	88	38	64.8	2.36	
Upper Sandusky	94	35	65.4	1.77	
Urbana	86	38	64.8	1.90	
Vanwert	97	33	66.2	1.74	
Vermillion	84	41	64.4	1.48	
Vickery	91	35	64.8	1.06	
Walnut	.....	.....	.....	2.35	
Warren	88	38	63.5	6.62	
Warsaw	90	34	63.8	2.67	
Wauseon	96	32	65.3	1.95	
Waverly	90	37	66.6	2.00	
Waynesville	94	38	66.0	2.45	
Wellington	88[f]	39	64.9[e]	1.95	
Willoughby	.....	.....	.....	4.74	
Wooster	86	34	63.3	5.64	
Zanesville	.....	.....	.....	1.56	
Oklahoma.					
Arapaho	91	36	73.9	0.72	
Beaver	97	35	72 7	2.06	
Blackburn	95	33	72.8	2.78	
Burnett	94	37	73.6	1.01	
Chandler	97	40	74.2	0.50	
Clifton	95	37	74.1	1.22	
Enid	98	37	74.0	2.05	
Fort Reno	95	40	74.2	1.00	
Fort Sill	97	42	75.2	1.45	
Hennessey	97	34	75.5	1.14	
Jefferson	98	32	72.0	2.06	
Jenkins	94	32	71.4	1.44	
Kenton	93	36	67.8	1.72	
Kingfisher	96	42	74.6	3.65	
Lyons	93	35	74.1	3.09	
Mangum	99	44	75.7	1.05	
Newkirk	94	39	73.4	4.24	
Norman	95	50	75.0	0.88	
Pawhuska	95	38	74.1	2.70	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Oklahoma—Cont'd.	°	°	°	*Ins.*	*Ins.*
Perry	96	35	73.8	1.75	
Pearch	.....	.....	.....	1.50	
Sac and Fox Agency	95	35	72.1	1.18	
Shawnee	98	42	74.2	1.22	
Stillwater	95	38	74.3	1.11	
Taloga	95[f]	45[f]	73.8[f]	0.39	
Vittum	91	40	73.4	2.55	
Waukomis	96	34	74.0	2.77	
Weatherford	96	40	74.0	0.51	
Woodward	99	37	74.6	1.65	
Oregon.					
Albany *a* [61]	90	45	59.9	3.77	
Albany *b*	.....	.....	.....	3.48	
Alpha	89	31	56.6	8.04	
Arlington	84	40	61.0	2.00	
Ashland *b*	92	36	59.2	2.23	
Aurora [61]	85	45	58.8	3.16	
Aurora (near)	88	38	57.5	3.93	
Bay City	81	36	55.0	7.76	
Bend	79[e]	26[e]	48.8[e]	.....	
Beulah	90	23	53.8	0.76	
Blalock	85	42	62.6	1.18	
Brownsville [61]	88	46	57.2	2.33	
Burns	85	26	52.4	0.07	
Cascade Locks	86	44	62.0	4.60	
Cloud Cap Inn	60[e]	29[e]	44.4[e]	.....	
Comstock	85	38	57.2	4.27	
Coquille	.....	.....	.....	4.70	
Corvallis	90	38	57.7	2.72	
Dayville	86	32	56.6	1.54	
Ella	.....	.....	.....	0.96	
Eugene	84	38	58.2	4.09	
Fairview	85	40	55.2	6.30	
Falls City	85	36	55.6	7.42	
Gardiner	87	41	57.8	5.92	
Glenora	85	32	55.7	8.73	
Government Camp	79	33	48.2	5.70	
Grants Pass	95	34	59.4	3.01	
Hare	88	44[j]	57.4[e]	8.58	
Harris	85	37	56.6	5.20	
Heppner	80	32	56.0	1.68	
Hood River (near)	86	38	57.4	3.30	
Huntington	88	35	62.1	0.51	
Jacksonville	95	38	60.0	2.45	
Joseph	79	25	48.0	1.27	
Junction City [59]	96	42	60.6	.....	
Kerby	96	31	57.3	4.55	
Klamath Falls	89	32	54.6	1.63	
Lafayette [61]	93	44	60.4	2.49	
Lagrande	83	32	54.6	2.10	
Lakeview	91	28	55.2	1.09	
Lonerock	78	33	52 2	3.00	
McMinnville	88	36	57.7	4.83	
Merlin [61]	92	38	57.7	2 17	
Monroe	86	39	58.2	4.43	
Mount Angel	91	40	58.4	3.40	
Nehalem	.....	.....	.....	7.33	
Newberg	90	35	58.6	4.61	
Newbridge	90	28	54.8	1.59	
Newport	77	41	55.0	3.40	
Pendleton	95	34	60.8	1.78	
Placer	.....	.....	.....	3.42	
Prineville	86	31	56.5	2.42	
Riddles [61]	90	40	60.3	2.26	
Riverside	87	25	55.1	0.38	
Salem *b*	84	38	59.9	3.25	
Shaniko	73	35	50.2	2.23	
Sheridan [61]	86	47	59.0	3.05	
Silverlake	92	30	52.4	1.09	
Silverton [61]	90	50	57.2	2.96	
Siskiyou [61]	92	40	54.6	3.03	
Sparta	.....	.....	.....	2.17	
Springfield [61]	81	41	57.5	3.27	
Stafford	92	40	58.0	4.73	
Tillamook	.....	.....	.....	2.29	
Toledo	92	37	57.0	3.71	
Umatilla	.....	.....	.....	0.95	
Vale	88	25	55.0	0.34	
Weston	80	31	54.0	2.93	
Williams	89	32	56.5	2.73	
Pennsylvania.					
Aleppo	88	35	64.3	3.98	
Altoona	86	35	60.9	2.59	
Athens	93	34	62.6	2.33	
Beaver Dam	.....	.....	.....	3.71	
Bellefonte	87	40	65.0	2 76	
Bethlehem	.....	.....	.....	3.18	
Brookville	.....	.....	.....	2.47	
Browers Lock	.....	.....	.....	3.13	
Butler	85	37	61.8	3.29	
Cassandra	82	35	59.6	3.13	
Centerhall	85	29	60.4	2.73	
Coatesville	91	37	67.6	5.00	
Confluence	89[j]	35[j]	65.6[j]	2.49	
Davis Island Dam	.....	.....	.....	2.21	
Driftwood	.....	.....	.....	4.03	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.	
Pennsylvania—Cont'd.	°	°	°	*Ins*	*Ins.*	
Duncannon	.....	.....	.....	2.47		
Dushore	88	30	58.9	3.33		
Dyberry	85	29	58.8	3.32		
East Bloomsburg	.....	.....	.....	2.42		
East Mauch Chunk	90	34	64.6	6.10		
Easton	87	41	66.2	2.71		
Ellwood Junction	.....	.....	.....	3.11		
Emporium	84	35	61.2	4.05		
Ephrata	90	38	66.9	2.96		
Everett	85	34	59.5[i]	2.33		
Forks of Neshaminy [61]	85[e]	46	65.0[e]	6.41		
Franklin	88	35	62.8	5.66		
Freeport	.....	.....	.....	2.44		
Girardville	.....	.....	.....	4.20		
Grampian	86	34	59.7	2.95		
Greensboro	.....	.....	.....	4.59		
Hamburg	.....	.....	.....	5.10		
Hamlinton	84	32	59.8	3.28		
Hawthorn	95	36	64.8	2.21		
Herrs Island Dam	.....	.....	.....	2.04		
Huntingdon *a*	90	36	64.2	3.15		
Huntingdon *b*	.....	.....	.....	2.49		
Irwin	.....	.....	.....	1.78		
Johnstown	89	38	65.1	3.87		
Keating	.....	.....	.....	4.06		
Kennett Square	89	41	66.8	4.25		
Lawrenceville	90	33	60.2	2.05		
Lebanon	91	37	66.2	3.65		
Leroy	85	34	61.4	3.70		
Lewisburg	87	38	64.2	3.85		
Lockhaven *a*	92	38	66.9	3.20		
Lockhaven *b*	.....	.....	.....	4.38		
Lock No. 4	.....	.....	.....	2.70		
Lycippus	.....	40	.....	3.06		
Mifflin	.....	.....	.....	2 80		
Oil City	.....	.....	.....	6.61		
Parker	.....	.....	.....	4.32		
Philadelphia	91	50	69.1	6.30		
Pottstown	88	46	68.2	2.16		
Quakertown	90	36	65.7	3.07		
Reading [2]	.....	.....	64.8	3.67		
Renovo *a*	.....	.....	.....	3.48		
Renovo *b*	86	38	63.3	3.21		
Saegerstown	84	33	61.4	6.53		
St. Marys	84	32	59.5	3.25		
Selinsgrove	87	38	64.8	3.52		
Shawmont	.....	.....	.....	3.73		
Shinglehouse	87[f]	33[f]	61.6[f]	3.32		
Smethport	85	32	59.8	5.27		
Somerset	.....	32	.....	3.83		
South Eaton	84	35	62.7	2.66	T.	
State College	84	38	62.5	2.35		
Sunbury	.....	.....	.....	1.60		
Swarthmore	85	44	66.1	2.25		
Towanda	85	35	61.8	3.95		
Troutrun	.....	.....	.....	4.04		
Uniontown	82	44	65.0	4.46		
Warren	83	36	61.1	3.59		
Wellsboro	87	36	62.6	2.14		
Westchester	88	43	66.9	3.99		
West Newton	.....	.....	.....	2.05		
Westtown [b]	90	40	64.0	2.11		
Wilkesbarre	87	35	63.1	1.64		
Williamsport	87	40	64.5	3.21		
York	91	35	66.6	2.36		
Rhode Island.						
Bristol	82	41	65.3	2.69		
Kingston	88	37	63.6	4.05		
Pawtucket	92	40	66.1	4.00		
Providence *a*	89	42	66.5	4.17		
Providence *c*	90	40	65.1	4.27		
South Carolina.						
Allendale	94	55	76.8	2.17		
Anderson	93	51	72.3	8.30		
Barksdale	91	50	70.4	6.06		
Batesburg	96	51	72.5	5.49		
Beaufort	94	59	77.8	0.44		
Blackville	97	52	75.7	2.32		
Bowman	96	55	76.1	0.80		
Calhoun Falls	.....	.....	.....	5.16		
Camden	.....	.....	.....	8.24		
Cheraw *a*	93	50	72.2	8.40		
Cheraw *b*	.....	.....	.....	7.28		
Clemson College	91	49	70.2	6.83		
Conway	95	54	75.8	3.50		
Darlington	96	52	74.8	4.74		
Due West	90	53	71.5	5.59		
Edisto	.....	.....	.....	4.48		
Effingham	.....	.....	.....	4.95		
Gaffney	.....	.....	.....	8.01		
Gillisonville	98	51	76.0	2.37		
Greenville	86	47	67.6	7.35		
Greenwood	91	48	70.6	5.92		
Kingstree *a*	92	52	72.8	2.21		
Kingstree *b*	.....	.....	.....	2.30		
Liberty	90	49	70.2	5.64		

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
South Carolina—Cont'd.	°	°	°	*Ins.*	*Ins.*
Little Mountain	94	50	73.0	4.35	
Longshore	95	51	72.2	4.48	
Pinopolis *1	90	57	73.9	2.78	
St. Georges	93	50	73.8	2.15	
St. Matthews	95	54	74.4	4.07	
St. Stephens				3.70	
Santuck	93	46	71.0	6.34	
Selvern	98	48	74.3	5.99	
Smiths Mills				3.95	
Society Hill	91	51	73.0	7.46	
Spartanburg	92	47	70.4	5.81	
Statesburg	93	52	74.0	3.36	
Summerville	91	56	74.2	0.91	
Temperance	95	51	75.0	4.81	
Trenton	90	54	73.8	7.25	
Trial	93	53	72.4	2.57	
Walhalla	87	46	68.2	4.22	
Winnsboro	93	52	72.6	4.35	
Winthrop College	91	47	71.2	4.73	
Yemassee	95	56	76.0	1.36	
Yorkville	91	50	71.6	6.81	
South Dakota.					
Aberdeen	90	20	56.7	5.10	
Academy	91	27	60.6	5.25	
Alexandria	92	30	59.6	6.12	
Armour	91	26	60.9	7.15	
Ashcroft	99	18	54 6	0.96	
Bad Nation	96	28	61.2	1.91	
Bowdle	95	17	53.4	4.17	
Brookings	88	29	57.6	5.09	
Canton	91	31	61.8	5.07	
Centerville				5.80	
Chamberlain	93	24	60.6	4.41	
Clark	86	26	55.8	8.41	
Desmet	89	29	57.6	6.60	
Doland	93	28	58.9	9.74	
Elkpoint	94	27	64.0	7.94	
Farmingdale				2.75	
Faulkton	92	21	56.8	3.12	
Flandreau	94	29	58.1	4.27	
Forestburg	93	27	58.8	6.64	
Fort Meade	92	22	55.6	1.35	
Gannvalley	92	23	59.0	4.84	
Gary	90	34	57.9	6.62	
Grand River School	95	18	57.0	1.60	
Greenwood	92	26	64.8	5.31	
Hartman	94	29	59.0	5.05	
Highmore				3.93	
Hitchcock				6.46	
Hotch City	94	27	58.2	2.31	
Howard	96	22	57.8	4.94	
Ipswich	95	20	58.4	1.90	T.
Kimball	87	26	57.9	6.93	
Leola	90	23	55.1	1.78	
Leslie	94	21	59.9	3.16	
Marion	90	26	60.4	5.16	
Mellette	92	25	58.6	5.87	
Menno	91	27	61.6	6.01	
Millbank	91	34	57.6	6.68	
Mitchell	92	46	60.0	6.72	
Mound City	94	20	58.0	1.65	
Oelrichs	90	22	58.4	1.64	
Pine Ridge	90	26	60.1	1.14	
Plankinton	94	23	58.4	9.42	
Redfield	92	22	56.8	6.63	
Rochford	88	17	52.2	1.21	
Rosebud	93	28	58.2	1.23	
St. Lawrence	94	20	57.8	7.40	
Silver City				0.92	
Sioux Falls	90	31	59.8	5.91	
Sisseton Agency	89	32	56.8	7.42	
Spearfish	94	26	55.4	0.68	
Vermillion	93	27	63.2	12.41	
Waubay	89	25	54.4	7.60	
Wentworth	89	30	59.5	4.32	
Wolsey				7.16	
Tennessee.					
Andersonville	84	37	60 3	3.50	
Arlington	92	39	70.6	4.90	
Ashwood	96	38	68.8	3.57	
Benton	90	40	68.9	3.76	
Bluff City				2.65	
Bolivar	91	40	69.5	4.53	
Bristol	86	37	65 9	2.00	
Brownsville	94	40	69.2	3.05	
Byrdstown	88	37	67.6	4.27	
Carthage	91	39	69.9	4.24	
Clarksville	90	40	69.2	4.60	
Clinton				2.87	
Covington	90	39	70.0	3.16	
Decatur	89	40	68.2	4.72	
Dickson	89	37	68.6	3.02	
Dyersburg	94	38	70.8	2.72	
Elizabethton	87	34	65.0	1.36	
Elk Valley	89	41	67.0	1.66	
Erasmus	88	34	63.0	4.72	
Tennessee—Cont'd.	°	°	°	*Ins.*	*Ins.*
Florence	87	41	68.0	2 93	
Franklin	89	40	68.0	4.62	
Grace *1	92	40	70.6	5.50	
Greeneville	85	37	65.2	1.80	
Harriman	87	93	67.0	4.51	
Hohenwald	89	35	67.6	4.24	
Iron City	89	38	68.5	4.65	
Johnsonville	94	52	71.9	4.39	
Jonesboro *1	82	36	64.8	2.01	
Kingston				3.59	
Lafayette *5	94	38	66 9	3.80	
Lewisburg	92	37	68.4	5.07	
Liberty	91	38	69.9	3.50	
Lynnville	88	42	67.8	5.32	
Maryville	89	41	68.9	3.23	
Milan	92	39	70.5	2.82	
Newport	87	42	67.7	2.35	
Nunnelly	91	35	68.4	5.93	
Oakhill	89	43	67.1	4.00	
Palmetto	91	40	69.6	4.57	
Peryear *5	92	40	70.2	1.30	
Pope	92	35	69.3	6.10	
Rogersville	83	40	65.6	4.60	
Rugby	89	34	64.4	6.16	
Savannah	91	41	70.6	5.72	
Sewanee	81	39	64.7	4.63	
Silverlake	81	34	61.1	2 02	
Springdale	90	36	66.4	3.58	
Springfield	92	36	69.2	4.60	
Tazewell				2.84	
Tellico Plains	90	39	68.5	3.62	
Tracy City	85	40	64.5	4.68	
Trenton	93	36	70.4	2.05	
Tullahoma	87	38	65.8	8.05	
Union City	90	38	70.7	1.40	
Waynesboro	89	34	67.2	4.25	
Wildersville	86	40	68.7	2.60	
Yukon	89	41	68.2	5.68	
Texas.					
Alvin				7.38	
Anna				0.43	
Arthur				2.69	
Austin *a*	95	50	76.1	1.60	
Austin *b* *5	96	49	76.8		
Ballinger	96	54	77.1	1.06	
Bastrop	96	54	82.1	T.	
Beaumont	97	49	77.6	4.89	
Beeville	101	48	77.1	4.16	
Big Spring				3.06	
Blanco	100	43	75.4	1.71	
Boerne *1	94	54	76.0	3.06	
Booth				3.89	
Bowie	102	51	78.8	0.28	
Brazoria	89	54	77.5	12.25	
Brenham	94	53	78.5	2.91	
Brighton	93	58	80.1	4.29	
Burnet	97	47	76.6	3.33	
Camp Eagle Pass	102	53	81.2	1.62	
Coleman	96	53	75.8	1.50	
College Station	97	41	75.2		
Columbia	90	50	75.7	6.30	
Comanche	99	48	75.9	1.18	
Corsicana	99	43	75.0	4.02	
Cotulla	102	69	86.1	0.80	
Cuero	100	59	80.6	4.89	
Dallas	100	45	76 8	3.58	
Danevang	93	48	77.2	2.79	
Dublin	97	45	75.8	0.70	
Duval	93	49	76.6	3.06	
Estelle	102	48	78.5	1.82	
Fort Brown	99	58	80.5	8.00	
Fort Clark	100	56	82.0	0.72	
Fort McIntosh	105	55	85.4	1.13	
Fort Ringgold	103	68	85.8	4 40	
Fort Stockton				2.60	
Fredericksburg	98	46	75.1	2.17	
Gainesville	97	41	75.7	0.15	
Grapevine	106	48	77.6	2.22	
Hale Center	90	47	71.6	3.04	
Hallettsville	94	52	78.6	2.66	
Haskell	106	48	79.2	0.77	
Hearne	98	58	80.3	0.78	
Henrietta	101	51	79.0	0 35	
Hewitt				2.75	
Hondo				2.22	
Houston	96	53	77.6	3.78	
Huntsville	95	48	77.0	1.40	
Ira	98	51	74.8	3.45	
Jacksonville	95	44	73.6	10.92	
Jasper	98	50	77.1	2.70	
Kaufman	97	55	78.2		
Kent				3.28	
Kerrville	96	40	74.2	1.76	
Kopperl				2.05	
Lampasas	98	48	77.3	4.08	
Lapara				7.75	
Texas—Cont'd	°	°	°	*Ins.*	*Ins.*
Laureles Ranch				6.04	
Llano *5	100	58	78.6	4.10	
Longview	99	50	76.6	6.12	
Luling	101	50	78.2	5.72	
Mann	107	44	77.2	4.22	
Menardville	98	48	73 3	5.53	
Mount Blanco	91	42	71.6	2.20	
Nacogdoches	94	47	74.2	5.17	
New Braunfelds	98	49	76.8	2.72	
Panter				2.79	
Paris *a*	98	45	75.8	1.20	
Port Lavaca	91	60	79.2	5.40	
Rhineland	97	47	77.8	1.79	
Rockisland	92	50	77.6	3.13	
Rockport	88	62	77.8	2.59	
Runge	102	49	79.4	5.79	
Sanderson	99	61	79.0	2.33	
San Marcos	99	47	77.2	3.99	
San Saba	99	52	76.7	2.79	
Santa Gertrudes Ranch				5.91	
Shaeffer Ranch	101	66	81.6	5.92	
Sherman	93	51	75.8	1.67	
Sulphur Springs	94	47	75.0	2.81	
Temple *a*	98	53	79.0	2.27	
Temple *b*	98	51	77.6	1.88	
Trinity	94	47	76.2	2.03	
Tyler	96	49	75.2	5.60	
Victoria				4.61	
Waco	98	51	79.3	4.99	
Waxahachie	101	41	77.6	1.70	
Weatherford	99	49	78.2	0.85	
Wichita Falls				2.36	
Utah.					
Aneth	93	34	68.6	0.00	
Blackrock	87	23	57.1	0.00	
Bluecreek *1	83	45	65.8	0.23	
Castledale	84	30	55.2	0.00	
Cisco	86	40	66.0	0.00	
Corinne	89	33	60.5	0.80	
Coyoto	86	18	53.2	0.00	
Deseret	90	24	58.0	0.03	
Emery	85	25	57.0	0.00	
Escalante	85	33	61.0	T.	
Farmington	86	40	60.8	0.99	
Fillmore	95	30	65.3	0.00	
Fish Springs	97	37	65.2	0.00	
Fort Duchesne	88	17	54.8	0.03	
Frisco	83	29	62.0	T.	
Giles	93	27	63.4	0.00	
Government Creek	85	31	59.6	0.39	2.0
Green River	100	30	68.9	0.00	
Grover	84	29	59.6	T.	
Heber	84	30	53.6	0.16	
Henefer	83	20	51.8	0.72	T.
Hite	98	43	73.0	0.00	
Huntsville				0.82	
Kelton *1	90	42	60.2	0.25	
Levan	84	28	58.0	0.18	
Loa	80	11	48.0	0.00	
Logan	84	35	59.2	1.03	
Manti	84	25	56.0	0.08	
Marysvale	87	22	57.3	0.02	
Meadowville	82	25	52.4	0.25	
Millville				0.91	
Minersville	84	32	60 8	0.02	
Moab	93	32	65.8	T.	
Mount Pleasant	85	32	60.2	0.16	
Ogden *1	89	37	61.0	0.85	T.
Park City	81	28	55.6	0.45	4.5
Parowan	85	28	58.8	0.04	
Pinto	83	30	55.0	0.00	
Promontory				0.35	
Provo	91	31	59.5		
Richfield	89	24	56.4	0.00	
St. George	100	31	67.6	0.00	
Scipio	87	24	58.6	0.10	
Snowville	83	34	58.8	0.21	
Soldier Summit	82	22	49.8	0.81	4.0
Terrace				0.00	
Thistle	95	18	58.3	0.25	
Tooele	87	36	62.4	0.20	
Tropic	81	21	52.3	0.00	
Vernal	90	28	61.8	0.04	
Woodruff	81	29	52.6	0.00	
Vermont.					
Bennington	80	31	60.2	2.93	
Burlington	83	38	63 2	3.07	
Chelsea	82	28	57.2	1.69	
Cornwall	89	31	61.8	1.36	
Enosburg Falls	88	25	57.7	2.76	
Hartland	87	26	58.0	2.63	
Jacksonville	86	23	57.1	4.55	
Manchester	83	30	58.6	4.02	
Newport	86			1 81	
Norwich	89	25	58.5	3.28	
St. Johnsbury	89	26	59.0	2.64	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Vermont—Cont'd.	°	°	°	*Ins.*	*Ins.*
Vernon[e,6]	84	33	61.0	4.82	
Wells	82	32	60.8	2.49	
Woodstock	86	26	57.6	2.06	
Virginia.					
Alexandria	91	43	68.1	1.38	
Ashland	92	44	67.8	3.89	
Barboursville	92	44	68.8	2.87	
Bedford	92	43	68.2	2.73	
Bigstone Gap	87	37	65.4	2.99	
Birdsnest[2]	.....	.....	68.8	5.85	
Blacksburg	85	34	61.6	2.59	
Bon Air	91	47	68.8	3.31	
Buckingham	92	45	68.0	6.02	
Burkes Garden	78	31	59.0	2.90	
Callaville	89	46	69.0	4.71	
Charlottesville	89	46	67.6	4.62	
Clifton Forge	79	38	60.8	3.02	
Columbia	92	42	68.4	4.80	
Dale Enterprise	88	36	63.1	3.84	
Doswell	93	40	68.6	3.82	
Farmville	90	45	69.2	3.40	
Fontella	90	42	68.2	2.51	
Fredericksburg	91	45	67.4	2.48	
Grahams Forge[e]	83	34	61.4	2.17	
Hampton	90	55	72.3	6.30	
Hot Springs	82	34	60.4	4.20	
Lincoln	90	41	66.6	3.04	
Manassas	89	42	66.6	1.69	
Marion	85	34	64.0	2.90	
Newport News	91	52	75.1	6.87	
Petersburg	95	45	69.6	3.45	
Quantico	94	45	68.6	.....	
Radford	.....	.....	.....	2.55	
Riverton	.....	.....	.....	3.16	
Roanoke	80	39	63.8	4.37	
Rockymount	.....	.....	.....	3.59	
Speers Ferry	.....	.....	.....	3.78	
Spottsville	92	46	69.9	6.46	
Stanardsville	.....	.....	.....	3.08	
Staunton	89	39	65.6	3.46	
Stephens City	93	39	66.4	4.36	
Warsaw	90	48	68.7	3.25	
Westpoint	90	49	67 2	2.75	
Williamsburg	89	49	69.2	5.05	
Woodstock	89	38	62.9	4.08	
Wytheville	87	35	64.0	2.27	
Washington.					
Aberdeen	80	33	54.6	4.65	
Anacortes	.....	.....	.....	1.54	
Ashford	.....	.....	.....	3.46	
Bremerton	88	37	57.8	2.55	
Brinnon	82	40	56.3	3.22	
Buchanan's Farm	.....	.....	.....	1.39	
Cedonia	74	31	51.4	3.37	
Cheney	.....	.....	.....	2.06	
Clearwater	80	35	54.8	6.60	
Cle Elum	80	22	52.4	0.69	
Colfax	86	31	55.2	2.46	
Colville	80	26	53.4	2.07	
Conconully	76	29	51.8	1.81	
Connell	.....	.....	.....	1.16	
Coupeville	81	39	55.8	1.14	
Crescent	75	28	52.4	3.04	
East Sound	77	33	52.8	1.17	
Ellensburg	77	25	53.0	0.52	
Ellensburg (near)	80	26	54.0	0.29	
Grandmound	85	32	56.2	2.72	
Granite Falls	.....	.....	.....	4.33	
Hooper	87	34	58.0	1.46	
Ilwaco	84	42	57.2	5.79	
Lacenter	87	39	57.4	3.61	
Lakeside	77	39	59.0	1.21	
Lind	92	25	57.2	1.24	
Mayfield	82	35	56.2	2.69	
Monte Cristo	80	32	51.5	6.27	
Mottinger Ranch	87	41	62.3	1.26	
Mount Pleasant	85	39	58.4	3.62	
Moxee Valley	84	33	56.8	1.15	
Olga	74	41	56.7	1.67	
Olympia	81	33	56.8	2.69	
Pasco	98	38	63.2	0.69	
Pinehill	86	36	58.3	2.01	
Pomeroy	87	36	57.6	1.97	
Port Townsend	75	42	56.6	1.23	
Renton	.....	.....	.....	2.44	
Republic	79[e]	25[b]	50.8[e]	2.81	
Ritzville	.....	.....	.....	0.80	
Rosalia	78	29	52.6	1.49	
Sedro	89	29	57.2	2.79	
Silvana	89	31	56.4	2.39	
Snohomish	83	33	55.1	2.70	
Snoqualmie	86	26	51.8	2.93	
Southbend	87	32	56.8	3.25	
Sprague	.....	.....	.....	1.95	
Stampede	.....	.....	.....	2.41	
Sunnyside	79	35	57.6	0.83	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Washington—Cont'd.	°	°	°	*Ins.*	*Ins.*
Twin	72	33	52.0	1.35	
Union	89	32	56.5	4.20	
Vancouver	85	35	56.4	3.07	
Vashon	82	41	55.8	2.59	
Waterville	76	29	53.2	1.14	
Wenatchee (near)	79	33	55.0	1.67	
Whatcom	77	32	55.8	1.48	
Wilbur	84	26	53.4	1.94	
West Virginia.					
Beckley	78	33	60.0	1.42	
Beverly	85	33	62.2	2.39	
Bluefield	83	40	63.9	1.68	
Buckhannon *a*	86	34	63.0	3.55	
Burlington	89	34	63.0	2.40	
Byrne	88	36	65.5	3.80	
Central	88	35	63.8	4.23	
Chapel	93	40	70.6	3.68	
Charleston	.....	.....	.....	3.57	
Clay	92	40	68.5	7.55	
Creston	.....	.....	.....	3.06	
Dayton	89	33	64.0	3.75	
Elkhorn	83	38	64.1	2.04	
Fairmont	.....	.....	.....	4.29	
Glenville	91	39	65.0	3.55	
Grafton	87	35	63.4	3.56	
Green Sulphur	85	37	64.1	1.65	
Harpers Ferry	.....	.....	.....	6.40	
Hinton *a*	.....	.....	.....	2.29	
Hinton *b*	85	42	63.6	.....	
Huntington	90	41	66.4	3.87	
Josiah	90	37	66.2	4.37	
Lewisburg	85	34	62.4	1.52	
Magnolia	90	38	65.2	4.11	
Mannington	90	37	65.2	3.38	
Martinsburg	89	40	63.6	2.10	
Morgantown	84	39	66.9	3.68	
Moscow	86	40	63.5	2.72	
New Martinsville	95	41	68.1	2.72	
Nuttallburg	83	36	63.4	3.27	
Oceana	86	40	66.0	4.60	
Oldfields	88	38	65.1	1.46	
Parsons	82[e]	30	60.7[e]	1.90	
Philippi *a*	88	27	60.0	2.70	
Point Pleasant	90	42	67.6	2.29	
Powellton	88	38	65.7	3.35	
Princeton	81	34	62.1	3.85	
Romney	88	35	65.6	2.10	
Rowlesburg	.....	.....	.....	2.68	
Southside	89	43	67.2	3.58	
Spencer	92	36	65.3	4.37	
Uppertract	85	33	63.2	2.49	
Wellsburg	83	37	63.0	3.67	
Weston *a*	.....	.....	.....	3.75	
Weston *b*	88	38	65.6	.....	
Wheeling *a*	.....	.....	.....	3.76	
Wheeling *b*	89	47	69.6	4.11	
Williamson	88	43	67.8	7.64	
Winfield	87	42	65.8	2.97	
Wisconsin.					
Antigo	89	30	56.9	3.97	
Appleton	87	36	59.8	3 09	
Ashland	.....	.....	.....	3.37	
Barron	92	30	54.6	6.55	
Beloit	90	33	62.0	2 03	
Brodhead	95	34	63.2	3.30	
Butternut	83	33	52.6	3.37	
Chilton	92	31	60.1	3.05	
Citypoint	94	29	59.3	4.29	
Darlington	93	30	59.8	3.63	
Dodgeville	93	32	60.8	4.13	
Easton	94	31	59.5	4.69	
Eau Claire	94	33	57.8	5.71	
Florence	84	35[1]	58.1[e]	3.29	
Fond du Lac	89	32	60.8	2.81	
Grand River Locks	.....	.....	.....	4.11	
Grantsburg	90	26	58.6	4.25	
Hartland	90	32	61.0	2.54	
Harvey	93	35	61.6	3.49	
Hayward	89	30	56.4	5.47	
Hillsboro	96	30	58.6	5.65	
Knapp	91	34	57.7	5.20	
Koepenick	86	32	56.2	5.20	
Ladysmith	90	27	57.4	4.40	
Lancaster	95[b]	33[4]	60.5[e]	3.33	
Madison	86	38	61.4	4.16	
Manitowoc	83	34	58.6	2 65	
Meadow Valley	96	31	58.6	6.17	
Medford	96	33	59.2	5.95	
Menasha	.....	.....	.....	2.96	
Neillsville	86	32	59.2	4.75	
New Holstein	93	30	62.5	4.40	
New London	95	34	59.7	3.46	
North Crandon	84	28	53.4	3.74	
Oconto	91	35[4]	59.4	4.79	
Osceola	90	26	56.6	5 20	
Oshkosh	91	33[4]	61.2	2.45	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Wisconsin—Cont'd.	°	°	°	*Ins.*	*Ins.*
Pepin	90	36	61.6	10.04	
Pine River	93	32	59.6	3.01	
Portage	91	35	61.2	3.17	
Port Washington	90	31	59.2	2.40	
Prairie du Chien *a*	96	36	62.0	4.15	
Prairie du Chien *b*	.....	.....	.....	4 38	
Prentice	88	28	57.2	3.71	
Racine	84	36	62.6	3.82	
Shawano	90	32	57.6	4.56	
Sheboygan	85	35	60.7	3.17	
Stevens Point	92	33	59.4	3.89	
Valley Junction	90	31	58.2	7.23	
Viroqua	92	34	59.6	9.04	
Watertown	89	30	59.8	3.74	
Waukesha	90	37	61.6	2.67	
Waupaca	92	33	59.6	3.82	
Wausau	89	33	58.0	4.52	
Wausaukee	91	29	57.9	2.65	
Westbend	93[4]	32[4]	62.8[4]	2.22	
Westfield	88	33	57.4	3.33	
Whitehall	91	33	59.0	6.44	
Wyoming.					
Alcova	94	26	59.6	T.	
Basin	.....	.....	.....	0.25	
Bedford	80	21	49.6	1.34	1.5
Bitter Creek	83	12	48.4	0.41	4.0
Buffalo	90	26	54.5	0 53	T.
Casper	91	26	58.2	T.	
Centennial	77	16	47.8	0.45	
Chugwater	85	24	55.8	0.65	
Daniel	77	15	44.5	0.72	.....
Evanston	78	19	49.4	0.13	
Fort Laramie	90	25	59.6	0.38	
Fort Washakie	86	23	52.7	0.24	
Fort Yellowstone	81	25	47.7	2.85	6.0
Fourbear	79	19	46.4	1.47	T.
Griggs	91	22	56.0	0.18	
Hyattville	90	26	55.8	0.11	T.
Iron Mountain	84	21	55.0	1.11	
Laramie	79	21	52.4	0.09	
Leo	82	12	51.4	0.10	T.
Lusk	84	23	55.5	0.20	
Moore	.....	.....	.....	0.12	T.
Parkman	92	25	53.6	0.30	T.
Pinebluff	85	28	57.8	0.90	
Rawlins	83	22	50.7	0.11	
Rocksprings	87[8]	19[8]	57.9[8]	.....	
Saratoga	85	20	53.8	0.08	
Sheridan	91	24	54.6	0.25	
South Pass City	78	18	45.5	0.70	6.0
Thayne	80	20	48.7	1.38	T.
Thermopolis	93	29	56.8	0.96	
Wheatland	92	29	63.6	0.53	
Cuba.					
Aguacate	94	72	82.6	8.38	
Alvarez	.....	.....	.....	5.97	
Australia	94	66	80.0	13.56	
Banaguises	92	65	79.2	12.25	
Batabano	96	70	80.2	7.54	
Camajuani	90	65	77.6	11.34	
Ciego de Avila	....	.....	.....	11.15	
Cruces	.....	.....	.....	10.14	
Gibara	96	69	82.2	6.41	
Guabairo	....	.....	.....	10.02	
Guanajay	89	66	77.6	12.18	
Guantanamo	95	69	80.4	9.48	
Guines	90	67	78.6	21.15	
Holguin	96	70	81.6	4.57	
Isabel, Guantanamo	.....	.....	.....	10.27	
Los Canos	97	67	81.0	6.43	
Magdalena	....	.....	.....	20.78	
Manzanillo	94	73	82.7	7.25	
Moron Trocha	96	67	81.8	12.31	
Nuevitas	100	71	85.1	3.20	
Pinar del Rio	91	70	80.8	14.92	
Romelle, Guantanamo	.....	.....	.....	8.77	
San Ceyetano	93	69	81.2	13 70	
Santa Clara	96	60	77.8	14.00	
Santa Cruz del Sur	91	70	79.8	14.00	
Soledad	91	67	78.0	13.36	
Soledad, Guantanamo	94	66	79.8	7.63	
Union de Reyes	91	72	81.4	11.51	
Yaguajay	94	71	81.0	12.51	
Yateras	.....	.....	.....	12.64	
Porto Rico.					
Adjuntas	90	58	74.4	20.32	
Aguirre	91	70	81.0	8.02	
Arecibo	91	69	79.8	6.05	
Barros	....	.....	.....	9.91	
Bayamon	....	69	.....	9.12	
Caguas	91	63	78.8	10.16	
Canovanas	92	78	81.4	10.81	
Cayey	100	60	79.4	10.92	
Coamo	100	64	80.8	10.17	
Corozal	94	64	79.0	12.17	
Fajardo	96	71	83.2	9.03	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Porto Rico—Cont'd.	°	°	°	*Ins.*	*Ins.*
Hacienda Amistad	95	65	79.2	7.97	
Hacienda Coloso	96	65	79.6	14.69	
Hacienda Peria	93	71	80.8	16.78	
Humacao	92	64	77.9	12.40	
Isabela	94	69	81.8	5.00	
La Isolina	90	65	77.4	12.25	
Las Marias	95	68	80.2	11.68	
Manati	97	66	81.2	7.28	
Maunabo	92	75	83.2	8 03	
Mayaguez	94	65	80.8	13.00	
Morovis	94	61	78.0	13.27	
Ponce	95	69	80.8	4.73	
Salinas	.....	.....	.....	9.19	
San Lorenzo	.....	66	.....	11.04	
San Salvador	90	64	76.8	16.21	
Santa Isabel	96	70	81.9	10.10	
Utuado	.....	68	.....	15.47	
Yauco	91	69	79.6	9.57	
Mexico.					
Ciudad P. Diaz	101	58	82.1	1.69	
Coatzacoalcos	94	65	79.6	14.60	
Leon de Aldamas	84	47	67.5	7.53	
Vera Cruz	96	71	81.1	4.42	
New Brunswick.					
St. John	80	39	57.8	3.47	
Nicaragua.					
Rivas	90	75	80.6	22.94	
Isthmus of Panama.					
Alhajuela	91	70	78.8	15.91	
La Boca	89	76	81.5	11.77	

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Alaska.					
Coal Harbor	68	38	52.2	1.63	
Fort Liscum	63	30	46.6	16.20	
Orca	71	40	52.7	27.02	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Arkansas.	°	°	°	*Ins.*	*Ins.*
Winchester	105	59	81.2	1.23	
California.					
Gilroy (near)	99	44	67.5	0.00	
Lick Observatory	91[b]	49[a]	71.6[a]	0.05	
Storey	107	52	79.7	T.	
Georgia.					
Valona	93	67	79.7	8.05	
Idaho.					
Paris	94	33	64.2	0.26	
Louisiana.					
Southern University	92	66	78.2	3.37	
Sugartown	97	61	82.8	.....	
Venice	95	70	81.3	8.05[a]	
Maine.					
Winslow	87	44	67.0	4.54	
Massachusetts.					
Lowell *b*	89	51	70.9	.....	
Michigan.					
Manistee	87	36	64.5	1.60	
Mount Pleasant	89	42	66.6	3.75	
Minnesota.					
Lakeside	91	45	71.0	.....	
Leech Lake	91	43	66.1	1.66	
Missouri.					
Cook Station	103	50	77.5	0.49	
New Jersey.					
Blairstown	91	50	72.0	15.80	
Toms River	92	49	73.7	8.62	
New Mexico.					
Deming	.....	.....	.....	0.90	
Los Lunas	101	52	75.5	1.80	
Olio	101	50	76.0	0.65	
North Carolina.					
Linville	79	46	64.8	.....	
New York.					
Straits Corners	85[c]	45[c]	67.8[c]	5.25	
Oklahoma.					
Texmo	.....	.....	.....	2.70	
Utah.					
Escalante	97	51	71.0	3.46	
Washington.					
Vashon	84	49	63.2	0.19	

EXPLANATION OF SIGNS.

[a] Extremes of temperature from observed readings of dry thermometer.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. + 4.

[2] Mean of 8 a. m. + 8 p. m. + 2.

[3] Mean of 7 a. m. + 7 p. m. + 2.

[4] Mean of 6 a. m. + 6 p. m. + 2.

[5] Mean of 7 a. m. + 2 p. m. + 2.

[6] Mean of readings at various hours reduced to true daily mean by special tables.

[7] Mean from hourly readings of thermograph.

[8] Mean of sunrise and noon.

[10] Mean of sunrise, noon, sunset, and midnight.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston *a*," "Livingston *b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance "[a]" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks, of whatever duration, in the precipitation record receive appropriate notice.

CORRECTIONS.

July, 1901, Kelton, Utah, make mean temperature 82.9° instead of 78.1°.

May, 1901, Ashland *a*, Nebr., make total precipitation 2.89 instead of 2 98.

March, 1901, Sedro, Wash., make mean temperature 44.9 instead of 43.9.

TABLE III.—*Resultant winds from observations at 8 a. m. and 8 p. m., dai'y. during the month of September, 1901.*

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
New England.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
Eastport, Me	17	19	7	32	s. 85 w.	23
Portland, Me	13	22	3	32	s. 73 w.	30
Northfield, Vt	10	42	7	7	s.	32
Boston, Mass	14	21	5	32	s. 75 w.	28
Nantucket, Mass	18	25	12	17	s. 36 w.	9
Block Island, R. I	18	22	11	25	s. 74 w.	15
New Haven, Conn	24	20	2	27	n. 81 w.	25
Middle Atlantic States.						
Albany, N. Y	22	25	2	17	s. 79 w.	15
Binghamton, N. Y†	10	3	15	6	n. 52 e.	11
New York, N. Y	21	19	14	19	n. 68 w.	5
Harrisburg, Pa†	11	5	11	9	n. 18 e.	6
Philadelphia, Pa	22	18	15	19	n 45 w.	6
Scranton, Pa	27	17	18	14	n. 22 e.	11
Atlantic City, N. J	24	13	17	18	n. 5 w.	11
Cape May, N. J	25	15	18	14	n. 23 e.	11
Baltimore, Md	25	14	21	12	n 39 e.	14
Washington, D. C	28	21	18	8	n. 55 e.	12
Lynchburg, Va	20	8	24	12	n. 45 e.	17
Norfolk, Va	29	17	21	8	n. 47 e.	18
Richmond, Va	34	11	19	9	n. 23 e.	25
South Atlantic States.						
Charlotte, N. C	28	14	27	7	n. 55 e.	24
Hatteras, N. C	27	17	21	12	n. 42 e.	14
Raleigh, N. C	37	13	10	13	n. 7 w.	24
Wilmington, N. C	21	17	21	15	n. 56 e.	7
Charleston, S. C	23	20	15	11	n. 33 e.	5
Columbia, S. C	30	12	27	8	n. 47 e.	26
Augusta, Ga	31	10	21	11	n. 24 e.	24
Savannah, Ga	21	19	18	14	n. 63 e.	4
Jacksonville, Fla	25	18	23	11	n. 60 e.	14
Florida Peninsula.						
Jupiter, Fla	12	24	32	7	s. 64 e.	28
Key West, Fla	13	16	44	1	s. 86 e.	43
Tampa, Fla	27	9	31	10	n. 49 e.	28
Eastern Gulf States.						
Atlanta, Ga	17	11	32	11	n. 74 e.	22
Macon, Ga†	17	7	6	3	n. 17 e.	10
Pensacola, Fla†	18	3	15	2	n. 69 e.	14
Mobile, Ala	32	15	13	10	n. 10 e.	17
Montgomery, Ala	14	14	26	5	e.	21
Meridian, Miss	16	4	13	3	n. 40 e.	16
Vicksburg, Miss	18	9	38	3	n. 76 e.	36
New Orleans, La	23	22	30	2	n. 88 e.	28
Western Gulf States.						
Shreveport, La	15	17	36	3	s. 87 e.	33
Fort Smith, Ark	16	13	39	5	n. 85 e.	34
Little Rock, Ark	19	22	28	8	s. 81 e.	20
Corpus Christi, Tex	18	17	31	4	n. 88 e.	27
Fort Worth, Tex	8	30	34	1	s. 56 e.	40
Galveston, Tex	18	16	36	2	n. 87 e.	34
Palestine, Tex	20	20	31	1	e.	30
San Antonio, Tex	12	13	45	2	s. 89 e.	43
Ohio Valley and Tennessee.						
Chattanooga, Tenn	28	16	18	14	n. 18 e.	13
Knoxville, Tenn	34	13	16	12	n. 20 e.	12
Memphis, Tenn	18	18	29	8	e.	21
Nashville, Tenn	25	17	20	15	n. 68 e.	22
Lexington, Ky†	8	10	13	3	s. 81 e.	13
Louisville, Ky	26	14	19	10	n. 37 e.	15
Evansville, Ind†	13	7	14	4	n. 59 e.	12
Indianapolis, Ind	21	19	18	15	n. 56 e.	4
Cincinnati, Ohio	19	20	24	12	s. 85 e.	12
Columbus, Ohio	17	16	25	17	n. 83 e.	8
Pittsburg, Pa	25	15	12	23	n. 48 w.	15
Parkersburg, W. Va	21	21	17	16	e.	1
Elkins, W. Va	18	20	15	24	s. 77 w.	9
Lower Lake Region.						
Buffalo, N. Y	9	21	11	29	s. 56 w.	22
Oswego, N. Y	11	34	12	15	s. 7 w.	23
Rochester, N. Y	7	27	12	31	s. 44 w.	28
Erie, Pa	10	26	12	22	s. 32 w.	18
Cleveland, Ohio	13	29	22	13	s. 29 e.	18
Sandusky, Ohio	14	23	17	19	s. 13 w.	9
Toledo, Ohio	14	20	14	23	s. 56 w.	11
Detroit, Mich	20	18	14	22	n. 76 w.	8
Upper Lake Region.						
Alpena, Mich	17	21	13	20	s. 60 w.	8
Escanaba, Mich	21	22	8	19	s. 85 w.	11
Grand Haven, Mich	16	23	17	19	s. 16 w.	7
Houghton, Mich.†	7	5	12	14	n. 45 w.	3
Marquette, Mich	19	20	13	26	s. 86 w.	13
Port Huron, Mich	15	18	14	22	s. 69 w.	8
Sault Ste. Marie, Mich	18	15	22	19	n 45 e.	4
Chicago, Ill	16	25	14	18	s. 24 w.	10
Milwaukee, Wis	18	20	10	22	s. 81 w.	12
Green Bay, Wis	18	29	13	14	s. 5 w.	11
Duluth, Minn	28	11	18	22	n. 12 w.	19
North Dakota.						
Moorhead, Minn	21	21	21	17	e.	4
Bismarck, N. Dak	18	14	23	17	n. 56 e.	7
Williston, N. Dak	21	4	15	18	n. 10 w.	17
Upper Mississippi Valley.						
St. Paul, Minn	17	24	14	17	s. 36 w.	9

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
Upper Mississippi Valley—Cont'd.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
La Crosse, Wis†	7	17	4	8	s. 22 w.	11
Davenport, Iowa	8	22	25	15	s. 36 e.	17
Des Moines, Iowa	15	22	19	14	s. 36 e.	9
Dubuque, Iowa	9	30	20	16	s. 11 e.	21
Keokuk, Iowa	15	28	19	17	s. 9 e.	13
Cairo, Ill	16	29	19	8	s. 43 e.	16
Springfield, Ill	12	29	14	16	s. 7 w.	17
Hannibal, Mo†	6	11	11	6	s. 45 e.	7
St. Louis, Mo	16	32	18	8	s. 24 e.	18
Missouri Valley.						
Columbia, Mo*	5	13	12	6	s. 37 e.	10
Kansas City, Mo	13	25	17	10	s. 30 e.	14
Springfield, Mo	10	30	29	5	s. 50 e.	31
Lincoln, Nebr	17	24	22	10	s. 60 e.	14
Omaha, Nebr	12	24	27	12	s. 51 e.	19
Valentine, Nebr	19	22	15	16	s. 18 w.	3
Sioux City, Iowa†	7	13	13	6	s. 45 e.	10
Pierre, S. Dak	18	17	25	13	n. 85 e.	12
Huron, S. Dak	16	19	26	16	s. 73 e.	10
Yankton, S. Dak†	6	9	9	9	s.	3
Northern Slope.						
Havre, Mont	16	12	21	27	n. 56 w.	7
Miles City, Mont	19	14	16	24	n. 58 w.	9
Helena, Mont	13	20	6	34	s. 76 w.	29
Kalispell, Mont	17	15	13	30	n. 83 w.	17
Rapid City, S. Dak	20	14	18	21	n. 27 w.	7
Cheyenne, Wyo	17	22	9	23	s. 70 w.	15
Lander, Wyo	13	23	7	34	s. 70 w.	29
North Platte, Nebr	14	18	30	13	s. 77 e.	18
Middle Slope.						
Denver, Colo	16	26	14	18	s. 22 w.	11
Pueblo, Colo	20	16	21	23	n. 27 w.	4
Concordia, Kans	11	29	17	11	s. 37 e.	10
Dodge, Kans	14	29	32	5	s. 61 e.	31
Wichita, Kans	16	36	14	3	s. 29 e.	23
Oklahoma, Okla	11	36	24	4	s. 39 e.	32
Southern Slope.						
Abilene, Tex	8	33	31	6	s. 45 e.	35
Amarillo, Tex	5	38	20	14	s. 9 e.	33
Southern Plateau.						
El Paso, Tex	23	8	27	19	n. 28 e.	17
Flagstaff, Ariz	14	20	22	39	s. 71 w.	18
Santa Fe, N. Mex	9	25	24	12	s. 37 e.	20
Phoenix, Ariz	13	10	25	20	n. 59 e.	6
Yuma, Ariz	14	18	15	26	s. 70 w.	12
Independence, Cal	21	22	13	19	s. 80 w.	6
Middle Plateau.						
Carson City, Nev	15	19	7	32	s. 81 w.	26
Winnemucca, Nev	24	13	17	24	n. 32 w.	13
Modena, Utah	4	21	5	43	s. 66 w.	42
Salt Lake City, Utah	22	18	23	15	n. 63 e.	9
Grand Junction, Colo	10	25	20	15	s. 18 e.	16
Northern Plateau.						
Baker City, Oreg	23	22	9	18	n. 8 w.	9
Boise, Idaho	20	14	14	26	n. 63 w.	13
Lewiston, Idaho†	4	11	18	4	s. 63 e.	16
Pocatello, Idaho	9	22	12	26	s. 47 w	19
Spokane, Wash	17	23	18	13	s. 40 e.	8
Walla Walla, Wash	5	36	7	17	s. 18 w.	33
North Pacific Coast Region.						
Neah Bay, Wash	4	16	26	26	s.	12
Port Crescent, Wash*	2	5	13	14	s. 18 w.	3
Seattle, Wash	20	19	16	16	n.	1
Tacoma, Wash	4	17	9	15	s. 25 w.	14
Astoria, Oreg	18	19	13	23	s. 84 w.	10
Portland, Oreg	22	21	12	20	n. 83 w.	8
Roseburg, Oreg	24	10	19	24	n. 20 w.	15
Middle Pacific Coast Region.						
Eureka, Cal	18	23	7	30	s. 78 w.	24
Mount Tamalpais, Cal	19	7	4	44	n. 73 w.	42
Red Bluff, Cal	28	20	20	6	n. 60 e.	16
Sacramento, Cal	11	37	13	12	s. 2 e.	26
San Francisco, Cal	1	21	1	48	s. 67 w.	51
South Pacific Coast Region.						
Fresno, Cal	31	3	6	38	n. 49 w.	42
Los Angeles, Cal	7	13	9	42	s. 80 w.	34
San Diego, Cal	26	12	8	29	n. 56 w.	25
San Luis Obispo, Cal	16	16	1	26	w.	25
West Indies.						
Basseterre, St. Kitts Island	23	6	40	3	n. 66 e.	41
Bridgetown, Barbados	11	18	40	6	s. 78 e.	35
Cienfuegos, Cuba	22	11	41	3	n. 74 e.	40
Grand Turk†	2	12	23	2	s. 65 e.	23
Havana, Cuba	11	12	46	2	s. 89 e.	44
Kingston, Jamaica	44	4	27	2	n. 32 e.	47
Port of Spain, Trinidad	16	15	37	5	n. 88 e.	32
Puerto Principe, Cuba	17	6	44	3	n. 75 e.	42
Roseau, Dominica, W. I	23	11	34	7	n. 66 e.	30
San Juan, Porto Rico	6	31	23	4	s. 37 e.	31
Santiago de Cuba, Cuba	29	17	22	6	n. 53 e.	20
Santo Domingo, W. I	44	12	9	2	n. 12 e.	33
Willemstad, Curaçao	6	12	49	1	s. 83 e.	48

* From observations at 8 p. m. only.

† From observations at 8 a. m. only.

TABLE IV.—*Thunderstorms and auroras, September*, 1901.

States.	No. of stations.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total. No.	Total. Days.	
Alabama	52	T.	1	1	....	1	....	..	....	....	1	....	....	1	3	1	3	6	2	1	....	....	....	....	....	....	....	....	....	....	....	....	21	11	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Arizona	56	T.	....	1	....	....	2	2	....	1	1	4	2	....	....	....	....	....	....	1	1	3	....	....	....	....	....	....	....	....	....	3	....	21	11	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Arkansas	57	T.	1	....	....	....	....	1	....	....	....	1	2	4	2	3	2	3	1	....	....	....	....	....	....	2	....	....	....	....	....	....	....	22	11	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
California	167	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	12	....	....	....	....	....	5	....	....	18	3	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Colorado	81	T.	1	5	18	4	3	5	7	8	7	3	1	1	2	....	....	....	....	1	....	....	....	....	....	1	....	....	3	....	1	....	....	71	17	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Connecticut	21	T.	1	....	1	1	1	....	1	....	....	....	12	....	....	....	10	3	3	....	....	..	....	....	....	....	....	....	....	....	7	7	....	47	11	T.
		A.	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Delaware	5	T.	....	1	1	....	....	....	....	....	....	1	....	....	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	6	4	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Dist. of Columbia	4	T.	1	1	1	....	....	....	....	....	....	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	5	5	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Florida	47	T.	1	3	4	5	3	....	....	....	....	1	....	....	4	4	7	5	6	5	3	2	3	4	1	....	2	2	4	4	3	4	....	80	23	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Georgia	55	T.	2	....	1	1	....	....	....	....	....	2	....	....	5	1	4	10	4	1	....	....	....	....	....	....	....	....	1	1	....	....	..	33	12	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Idaho	34	T.	....	....	3	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	3	....	....	....	....	....	....	....	....	....	13	4	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	1	A.
Illinois	92	T.	....	....	....	1	....	....	....	1	12	5	15	4	..	11	8	....	1	....	....	....	..	1	....	....	....	....	....	....	....	....	....	59	10	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1	1	A.
Indiana	58	T.	....	....	....	....	....	....	....	....	4	7	17	7	....	1	3	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	40	7	T.
		A.	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Indian Territory	11	T.	1	....	....	....	....	....	....	1	1	....	....	....	....	1	..	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	5	5	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Iowa	149	T.	....	....	....	....	....	5	3	9	12	7	19	3	7	12	4	....	....	..	2	....	....	1	....	....	23	1	17	10	1	6	....	142	18	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Kansas	77	T.	1	1	....	6	4	5	9	7	13	11	10	2	26	16	....	7	1	1	1	....	....	....	....	4	12	5	2	10	2	....	....	156	23	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Kentucky	41	T.	....	....	..	....	....	....	....	....	1	5	5	6	....	....	..	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	18	5	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Louisiana	46	T.	2	7	8	4	1	1	....	....	....	....	....	....	11	5	5	7	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	53	12	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Maine	19	T.	....	....	1	1	....	....	4	....	....	....	1	1	....	....	....	....	1	....	....	....	....	....	....	1	....	....	....	....	....	....	....	10	7	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Maryland	48	T.	14	11	8	....	....	....	....	....	....	14	4	....	....	....	12	1	1	....	....	....	....	....	....	....	....	....	1	1	10	2	....	79	12	T.
		A.	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Massachusetts	48	T.	....	....	3	....	....	....	1	....	....	....	16	3	2	....	16	....	6	....	....	....	....	....	....	....	....	....	....	....	....	4	....	51	8	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Michigan	106	T.	1	....	....	....	....	1	1	1	5	3	3	18	1	1	13	1	....	....	..	2	....	2	....	....	4	7	2	....	....	1	....	62	18	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Minnesota	67	T.	....	1	....	....	1	2	....	1	1	1	6	....	2	5	6	....	....	....	....	....	1	2	....	17	14	3	19	5	...	11	....	98	18	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Mississippi	44	T.	4	2	2	1	..	....	....	....	....	....	1	3	6	7	3	8	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	39	11	T.
		A.	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Missouri	95	T.	1	....	....	....	....	....	....	13	17	27	31	3	16	10	3	2	....	...	3	....	....	....	1	1	22	7	....	5	1	....	....	163	17	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Montana	40	T.	4	11	4	7	....	3	3	2	....	2	....	....	....	3	1	....	....	....	....	2	1	1	....	2	....	3	....	....	1	....	....	50	16	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Nebraska	142	T.	....	1	....	16	6	17	19	17	4	22	26	3	21	5	....	5	3	4	5	....	....	....	....	14	16	11	11	7	1	..	....	234	22	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Nevada	40	T.	1	3	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	....	....	....	....	....	....	....	7	5	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
New Hampshire	19	T.	....	....	5	1	....	....	....	....	....	....	3	1	5	....	3	1	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	24	8	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	2	A.
New Jersey	51	T.	17	8	9	....	2	..	2	....	....	4	15	11	....	....	20	4	16	....	....	....	....	....	....	....	....	....	....	1	7	2	....	118	14	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
New Mexico	31	T.	4	5	4	....	....	3	2	4	4	1	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	4	2	....	36	13	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
New York	99	T.	3	1	5	4	....	....	1	3	1	3	19	12	5	1	9	2	3	1	....	....	1	....	....	....	1	3	....	....	22	5	....	105	21	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	A.
North Carolina	56	T.	2	....	....	....	....	....	....	3	1	2	....	7	....	5	5	13	5	3	....	....	....	....	....	....	....	....	....	1	2	....	....	49	12	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
North Dakota	48	T.	....	....	....	....	....	1	....	1	....	2	....	....	....	1	....	....	....	....	....	....	....	....	....	10	3	....	1	....	....	3	....	22	7	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	A.
Ohio	128	T.	7	1	....	....	....	....	....	....	5	14	3	17	3	2	6	....	....	....	....	2	....	....	....	....	....	....	....	1	..	....	....	61	11	T.
		A.	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	A.
Oklahoma	23	T.	....	....	....	....	..	2	1	....	1	...	....	1	1	3	....	....	....	1	....	1	....	....	....	....	1	....	....	....	....	....	....	12	9	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Oregon	74	T.	1	....	....	....	....	1	....	..	1	1	....	....	....	....	....	....	....	....	....	1	4	3	..	....	4	1	....	....	....	....	....	17	9	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Pennsylvania	91	T.	18	11	3	....	....	....	....	....	....	13	10	7	6	....	14	....	4	....	....	....	....	....	....	....	1	....	....	16	4	....	107	12	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Rhode Island	7	T.	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
South Carolina	46	T.	3	2	2	....	....	....	....	....	1	1	....	2	....	2	2	14	9	2	....	....	....	....	....	....	....	....	....	1	1	....	....	42	13	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
South Dakota	56	T.	....	....	....	6	7	6	10	1	1	14	8	1	2	2	4	....	..	2	....	....	....	1	1	11	9	....	1	....	6	....	....	93	19	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Tennessee	56	T.	....	....	....	....	....	....	1	....	....	6	....	6	1	8	5	7	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	87	8	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Texas	95	T.	9	5	6	2	3	3	2	1	....	3	5	7	5	7	3	1	....	....	....	....	....	....	....	3	....	....	....	1	2	1	....	69	19	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Utah	47	T.	....	....	8	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	9	2	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Vermont	16	T.	1	....	....	....	....	....	1	....	....	....	5	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	10	6	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Virginia	50	T.	5	3	6	1	....	....	....	2	3	13	2	1	1	....	8	5	2	....	....	....	....	....	....	....	....	....	....	5	....	....	....	57	14	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Washington	64	T.	1	....	....	1	1	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	5	....	....	....	....	....	....	....	10	6	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
West Virginia	43	T.	4	....	....	....	..	....	....	1	3	15	6	2	1	....	3	....	2	....	....	1	....	....	....	....	....	....	....	1	....	....	....	39	11	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Wisconsin	60	T.	....	....	....	....	1	1	1	1	4	1	3	1	1	8	10	....	....	....	....	1	....	1	1	4	14	5	9	3	3	8	....	81	21	T.
		A.	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	A.
Wyoming	31	T.	...	3	12	3	....	2	....	....	....	1	3	....	1	....	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	27	9	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Sums	2,893	T	112	88	116	70	85	61	70	79	104	210	255	130	142	125	198	106	82	23	15	16	15	20	18	70	130	51	72	50	96	70	...	2,629	....	T
		A.	....	....	....	....	....	....	....	....	....	2	...	....	....	..	....	2	1	1	....	...	1	....	....	....	....	....	....	....	1	....	...	8	....	A.

TABLE V.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.75 in 1 hour during September, 1901, at all stations furnished with self-registering gages.*

Stations.	Date.	Total duration.		Total am't of precipitation.	Excessive rate.		Amount before excessive began.	Depths of precipitation (in inches) during periods of time indicated.												
		From—	To—		Began—	Ended—		5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Albany, N. Y.	17			0.68														0.40			
Alpena, Mich.	10			1.26														0.35			
Atlanta, Ga.	16-17			2.57														0.59			
Atlantic City, N. J.	29			0.75														0.31			
Baltimore, Md.	3			0.50														0.50			
Binghamton, N. Y.	17			0.70														0.55			
Bismarck, N. Dak.	24-25			0.63														0.29			
Boise, Idaho	21			0.11																	
Boston, Mass.	11			0.59														0.30			
Buffalo, N. Y	28			0.80														0.46			
Cairo, Ill.	11-12			1.07														0.52			
Charleston, S. C.	15			0.11					0.11												
Chicago, Ill.	11			1.96														0.78			
Cincinnati, Ohio	12			0.35														0.22			
Cleveland, Ohio	1	6.00 a.m.	1.35 p.m.	3.76	8.10 a.m. 11.00 a.m.	9.40 a.m. 12.0 1p.m.	0.44 2.75	0.17 0.05	0.21 0.17	0.25 0.27	0.28 0.34	0.36 0.40	0.49 0.22	0.75 0.44	1.09 0.51	1.36 0.60	1.56 0.68	1.70 0.99	1.90	2.09	
Columbia, Mo.	11			0.26						0.26											
Columbus, Ohio	17			0.49														0.34			
Denver, Colo.	3			0.21								0.21									
Des Moines, Iowa	11			1.22														*			
Detroit, Mich.	11-12			0.92														0.43			
Dodge, Kans	8			0.66														0.51			
Duluth, Minn.	25			1.13														*			
Eastport, Me.	11-12			0.95														0.25			
Elkins, W. Va	10			0.65														0.63			
Erie, Pa.	28			0.70														0.25			
Escanaba, Mich.	29			0.75														0.18			
Evansville, Ind	11			0.48										0.48							
Fort Worth, Tex.	2	4.55 p.m.	5.35 p.m.	0.78	4.55 p.m.	5.35 p.m.	0.00	0.06	0.11	0.33	0.48	0.62	0.67	0.70	0.74	0.76					
Fresno, Cal.	30			0.48														*			
Galveston, Tex.	1	5.45 a.m.	8.05 a.m.	1.18	6.10 a.m	6.54 a.m.	T.	0.32	0.57	0.66	0.82	0.92	1.02	1.04	1.08	1.18					
Do	15	6.30 a.m.	12.30 p.m.	2.76	6.40 a.m.	7.15 a.m.	0.01	0.22	0.56	0.88	1.21	1.42	1.70	1.90	1.98	2.00					
Grand Junction, Colo.	3			T.																	
Harrisburg, Pa	10			0.76														0.59			
Hatteras, N. C.	28	1.40 a.m.	9.50 a.m.	2.12	7.20 a.m.	8.10 a.m.	0.81	0.11	0.27	0.45	0.67	0.79	0.82	0.86	0.91	0.97	1.09	1.10			
Huron, S. Dak.	24	8.07 p.m.	1.05 a.m.	1.57	8.45 p.m.	9.20 p.m.	0.08	0.08	0.24	0.43	0.56	0.70	0.88	1.00	1.01	1.02	1.07	1.16			
Indianapolis, Ind.	10			0.20														0.10			
Jacksonville, Fla.	2	7.09 p.m.	8.50 p.m.	1.97	7.09 p.m.	7.40 p.m.	0.00	0.14	0.40	0.85	1.36	1.76	1.92	1.93							
Jupiter, Fla.	10	4.05 p.m.	4.55 p.m.	2.58	4.05 p.m.	4.45 p.m.	0.00	0.10	0.35	0.67	1.27	1.77	2.22	2.42	2.52	2.55	2.58				
Kalispell, Mont	6-7			0.25														0.12			
Kansas City, Mo.	9			0.41								0.40									
Key West, Fla.	4	8.57 a.m.	11.00 a.m.	0.98	9.45 a.m.	10.20 a.m.	0.04	0.08	0.27	0.58	0.74	0.77	0.79	0.90							
Do	26	2.25 p.m.	4.45 p.m.	1.43	3.25 p.m	3.55 p.m.	0.36	0.14	0.56	0.83	0.91	0.94	1.01	1.08							
Knoxville, Tenn	14-15	8.01 p.m.	D. N.	1.02	8.02 p.m.	8.35 p.m.	T.	0.32	0.47	0.55	0.65	0.67	0.75								
Lexington, Ky.	12			1.21																	
Lincoln, Nebr.	10	8.30 p.m.	10.45 p.m.	1.59	10.05 p.m. 11.50 p.m.	10.30 p.m. 12.30 a.m.	0.64 0.32	0.06 0.05	0.18 0.23	0.53 0.43	0.81 0.77	0.93 0.81	0.82	0.89	0.94			0.71			
Little Rock, Ark.	13-14	5.10 p.m.	6.15 a.m.	3.47	3.35 a.m.	5.10 a.m.	1.28	0.07	0.21	0.31	0.40	0.45	0.55	0.59	0.74	0.91	0 94	1.17	1.69	2.06	
Do	24	1.15 p.m.	2.55 p.m.	1.53	1.15 p.m.	2.25 p.m.	0.00	0.10	0.18	0.38	0.57	0.62	0.64	0.69	0.73	0.79	0.80	1.14	1.50		
Los Angeles, Cal.	30			0.02														0 02			
Louisville, Ky.	12			1.21														0.43			
Macon, Ga.	13	5.40 p.m.	6.25 p.m.	0.78	5.40 p.m.	6.05 p.m.	0.00	0.22	0.48	0.64	0.71	0.75									
Memphis, Tenn.	14	2.00 a.m.	4.30 p.m.	4.66	2.35 a.m. 6.10 a.m.	3.35 a.m. 7.45 a.m.	0.01 2.06	0.07 0.07	0.20 0.14	0.27 0.20	0.30 0.23	0.34 0.25	0.42 0.26	0.55 0.45	0.68 0.56	0.73 0.66	0.79 0.95	1.07 1.28	1.23 1.45	1.81	
Meridian, Miss.	13	11.52 a.m.	4.00 p.m.	1.32	12.05 p.m.	12.30 p.m.	T.	0.08	0.31	0.55	0.59	0.69	0.70	0.74	0.76	0.81					
Milwaukee, Wis.	8-9			0.60														0.14			
Montgomery, Ala.	27-28			1.96														0.66			
Nantucket, Mass.	29-30			0.52										0.18							
Nashville, Tenn.	14	9.40 a.m.	5.30 p.m.	1.99	12.08 p.m.	1.05 p.m.	0.28	0.27	0.47	0.55	0.59	0.66	0.68	0.72	0.93	1.02	1.13	1.23	1.31		
New Haven, Conn.	10-11	10.25 p.m.	6.15 a.m.	3.15	2.35 a.m.	3.30 a.m.	0.32	0.06	0.17	0.36	0.46	0.59	0.79	1.21	1.56	1.86	2.22	2.37			
New Orleans, La.	16	1.25 p.m.	3.00 p.m.	1.49	1.33 p.m.	2.05 p.m.	0.04	0.19	0.42	0.74	0.96	1.15	1.29	1.32	1.35	1.38	1.43	1.45			
New York, N. Y.	12			0.34							0.33										
Norfolk, Va.	17-19			4.69														0.78			
Northfield, Vt.	15			0.39														0.35			
Oklahoma, Okla.	9			0.29														0.21			
Omaha, Nebr.	26-27			1.40														1.30†			
Parkersburg, W. Va.	10	2.57 p.m.	4.20 p.m.	0.50	3.02 p.m.	3.22 p.m.	T.	0.20	0.35	0.40	0.49	0.50									
Philadelphia, Pa.	11	4.29 p.m.	7.12 p.m.	0.92	5.40 p.m.	6.00 p.m.	0.13	0.04	0.19	0.43	0.60	0.63									
Pittsburg, Pa.	15			0.23											0.23						
Pocatello, Idaho	23-24			0.53														0.12			
Portland, Me.	17			0.72														0.35			
Portland, Oreg.	21-22			1.22														0.22			
Pueblo, Colo.	3			0.18						0.17											
Raleigh, N. C.	29	9.15 a.m.	11.00 a.m.	2.40	9.55 a.m.	10.50 a.m.	0.05	0.06	0.17	0.35	0.60	0.76	0.99	1.22	1.48	1.84	2.11	2.33			
Richmond, Va.	16-17			0.60														0.54			
Rochester, N. Y.	15			0.55														0.54†			
St. Louis, Mo.	10			0.26					0.24												
St. Paul, Minn.	25			0.97														0.39			
Salt Lake City, Utah	23-24			0.66														0.19			
San Diego, Cal.	23			0.06																	
Sandusky, Ohio	1			0.27														0.26			
San Francisco, Cal.	23			0.63														0.56†			
Savannah, Ga.	17			0.88														0.59			
Seattle, Wash.	24-25			0.67														0.13			
Spokane, Wash.	26			0.35														0.25			
Springfield, Ill.	14	12.30 p.m.	2.00 p.m.	0.69	12.55 p.m.	1.20 p.m.	T.	0.07	0.28	0.46	0.61	0.69									
Tampa, Fla.	28-29			2.01														0.44			
Toledo, Ohio	10			0.40														0.40			
Topeka, Kans.	13	4.45 p.m.	10.20 p.m.	4.00	5.40 p.m.	6.50 p.m.	0.11	0.43	0.75	0.97	1.12	1.60	1.78	2.14	2.32	2 37	2.53	2.81	2.92		
Valentine, Nebr.	6-7			1.37														0.74			
Vicksburg, Miss.	13			0.57						0.57											
Washington, D. C.	28-29			0.59																	
Wilmington, N. C.	18	9 00 a.m.	10.05 a.m.	1.00	9.10 a.m.	9.35 a.m.	0.05	0.11	0.31	0.58	0.69	0.80	0.80	0.85	0.92						
Do	18	3.52 p.m.	4.25 p.m.	0.67	3.58 p.m.	4 13 p.m.	T.	0.13	0.32	0.47	0.67										
Do	27-28	1.40 p.m.	8.45 a.m.	2.12	4.00 a.m.	5.00 a.m.	0.33	0.22	0.39	0.48	0.51	0.57	0.68	0.68	0.69	0.70	0.89	1.13	1.25		
Yankton, S. Dak	10-11			2.28														0.48			
Basseterre, St. Kitts	11	2.02 p.m.	10.00 p.m.	3.64	3 00 p.m.	4.55 p.m.	0.15	0.10	0 22	0.36	0.49	0.62	0.79	1.02	1.16	1.34	1.49	1.69	2.04	2.33	2.78
Do	19	8.35 a.m.	2.55 p.m.	1.24	9 05 a.m.	9.35 a.m.	0.03	0.06	0.21	0.42	0.57	0.66	0.72								
Bridgetown, Barbados	17	1.19 p.m.	10.40 p.m.	2.04	6.55 p.m.	7.14 p.m.	1.10	0.05	0.33	0.58	0.69	0.70									

TABLE V.—*Accumulated amounts of precipitation for each 5 minutes, etc.*—Continued.

Stations.	Date.	Total duration. From—	Total duration. To—	Total amt of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	Depths of precipitation (in inches) during periods of time as indicated. 5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Bridgetown, Barbados	29	9.18 a.m.	4.12 p.m.	1.70	11.15 a.m.	11.45 a.m.	0.80	0.07	0.32	0.54	0.72	0.77	0 81	.....	.....	....	.....	.....	.....	.....	.....
Cienfuegos, Cuba	5	5.13 p.m.	10.40 p.m.	0.86	7.20 p.m.	7.45 p.m.	0.04	0.07	0.28	0.50	0.60	0.66	0.79	.....	.....	.....	.....	.....	.....	.....	.....
Do	27	1.45 a.m.	4.30 a.m.	2.29	2.09 a.m.	3.00 a.m.	0.06	0.35	0.61	0.71	0.87	1.14	1.46	1.68	1.78	1.91	2.04	2.12	.....	.....	.....
Havana Cuba	2	1.25 p.m.	2.00 p.m.	0.78	1.25 p.m.	1.52 p.m.	0.00	0.21	0.42	0.62	0.74	0.78	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kingston, Jamaica	13-14	9.25 p.m.	8.40 a.m.	1.75	10.10 p.m.	10.25 p.m.	0.05	0.24	0.42	0.53	0.55	0.57	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	29	12.43 p.m.	2.43 p.m.	1.60	1.20 p.m.	2.15 p.m.	0.04	0.18	0.40	0.43	0.46	0.56	0.69	0.85	1.05	1.25	1.35	1.46	.....	.....	.....
Port of Spain, Trin	15	10.55 a.m.	1.01 p.m.	2.09	11.20 a.m.	12.15 p.m.	0.02	0.16	0.46	0.74	0.97	1.10	1.21	1.35	1.48	1.62	1.87	2.03	.....	.....	.....
Puerto Principe, Cuba	1	4.55 p.m.	7.45 p.m.	0.97	5.00 p.m.	5.35 p.m.	0.01	0.08	0.26	0.46	0.59	0.70	0.80	0.85	0.88	.....	.....	.....	.....	.....	.....
Do	6	3.03 p.m.	D. N.	2.28	3.03 p.m.	4.00 p.m.	0.00	0.21	0.38	0.44	0.50	0.52	0.55	0.57	0.64	0.85	1.05	1.38	.....	.....	.....
Do	10	3.20 p.m.	8.30 p.m.	1.30	3.20 p.m.	4.00 p.m.	0.00	0.11	0.35	0.65	0.77	0.93	1.12	1.19	1.24	.....	.....	.....	.....	.....	.....
Do	30	5.23 p.m.	6.22 p.m.	0.86	5.33 p.m.	5.50 p.m.	0.02	0.27	0.60	0.73	0.76	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Roseau, Dominica	11	10.13 a.m.	10.37 a.m.	0.64	10.17 a.m.	10.32 a.m.	T.	0.15	0.42	0.63	0.64	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	18-19	10.00 p.m.	9.50 a.m.	1.28	10.12 p.m.	10.45 p.m.	0.05	0.13	0.29	0.46	0.62	0.71	0.79	0.84	.....	.....	.....	.....	.....	.....	.....
San Juan, Porto Rico	25	5.35 p.m.	8.15 p.m.	1.47	5.35 p.m.	6.00 p.m.	0.00	0.06	0.30	0.48	0.68	0.90	0.92	.....	.....	.....	.....	.....	.....	.....	.....
					8.30 p.m.	9.20 p.m.	0.15	0.10	0.22	0.36	0.48	0.51	0.57	0.60	0.61	0.65	0.88	.....	.....	.....	.....
					9.20 p.m.	10.10 p.m.	.....	0.96	1.02	1.30	1.38	1.57	1.73	1.84	1.94	2.02	2.06	.....	.....	.....	.....
Santiago de Cuba	13-14	6.53 p.m.	9.24 a.m.	8.22	10.10 p.m.	11.00 p.m.	.....	2.12	2.30	2.30	2.42	2.63	2.83	3.01	3.22	3.41	3.53	.....	.....	.....	.....
					11.00 p.m.	11.30 p.m.	.....	3.65	3.78	4.02	4.32	4.50	4.68	4.79	4.95	5.14	5.54	.....	.....	.....	.....
					11.30 p.m.	12.40 a.m.	.....	5.74	5.85	5.89	5.96	6.01	6.05	6.10	6.20	6.30	6.39	.....	.....	.....	.....
					12.40 a.m.	1.15 a.m.	.....	6.54	6.70	6.79	6.83	6.89	7.01	7.06	7.09	7.11	7.14	7.18	.....	.....	.....
Santo Domingo, W.I.	12-13	1.10 p.m.	5.10 a.m.	5.05	4.05 p.m.	4.55 p.m.	0.41	0.11	0.19	0.23	0.26	0.31	0.43	0.64	0.79	0.96	1.17	1.22	.....	.....	.....
					7.05 p.m.	8.15 p.m.	1.71	0.09	0.40	0.58	0.65	0.66	0.67	0.69	0.73	0.74	0.81	1.16	1.57	.....	.....
Willemstad, Curaçao	16-17	9.04 p.m.	2.45 a.m.	1.17	12.35 a.m.	1.15 a.m.	0.09	0.05	0.11	0.17	0.23	0.52	0.71	0.76	0.81	0.82	0.83	0 97	.....	.....	....

*Self-register not working. †Estimated.

TABLE VI.—*Data furnished by the Canadian Meteorological Service, September*, 1901.

Stations.	Pressure. Mean not reduced.	Pressure. Mean reduced.	Pressure. Departure from normal.	Temperature. Mean.	Temperature. Departure from normal.	Temperature. Mean maximum.	Temperature. Mean minimum.	Precipitation. Total.	Precipitation. Departure from normal.	Precipitation. Depth of snow.
	Ins.	*Ins.*	*Ins.*	°	°	°	°	*Ins.*	*Ins.*	*Ins.*
St. Johns, N. F.	29.71	29.85	—.15	55.2	+ 1.2	64.2	46.2	1.45	—2.24	
Sydney, C. B. I.	29.93	29.97	—.06	60.9	+ 4.4	70.4	51.4	3.60	+0.36	
Halifax, N. S.	29.91	30.02	—.03	61.5	+ 3.9	70.3	52.7	6.86	+3.31	
Grand Manan, N. B.	29.96	30.01	—.03	59.3	+ 3.2	66.7	51.9	3.58	+1.78	
Yarmouth, N. S.	29.98	30.06	—.01	58.1	+ 2.0	64.6	51.7	4.24	+1.65	
Charlottet'n, P. E. I.	29.92	29.96	—.06	60.5	+ 3.2	69.5	51.5	3.45	+0.59	
Chatham, N. B.	29.95	29.97	—.04	59.3	+ 3.9	70.0	48.7	1.76	—0.96	
Father Point, Que.	29.93	29.96	—.03	50.2	—0.2	58.1	42.3	1.44	—1.36	
Quebec, Que.	29.68	30.00	—.02	57.3	+ 2.2	66.2	48.5	2.90	—0.77	
Montreal, Que.	29.82	30.02	—.01	60.6	+ 2.2	68.1	53.1	3.95	+0.72	
Bissett, Ont.	29.44	30.05	+.02	55.8	+ 0.1	70.2	41.3	2.38	—1.32	
Ottawa, Ont.	29.76	30.07	+.04	60.7	+ 3.3	71.1	50.4	1.91	—0.75	
Kingston, Ont	29.73	30.04	.00	61.7	+ 1.7	69.1	54.2	3.11	+0.34	
Toronto, Ont	29.67	30.05	—.01	61.6	+ 2.6	70.7	52.5	3.05	+0.30	
White River, Ont.	28.69	30.04	+.04	50.6	+ 0.3	64.4	36.8	3.14	+0.06	2.0
Port Stanley, Ont	29.42	30.05	+.01	62.2	+ 2.7	70.7	53.6	2.57	—0.08	
Saugeen, Ont.	29.35	30.05	+.01	59.9	+ 2.4	67.9	52.0	2.69	—0.82	
Parry Sound, Ont	29.35	30.03	.00	58.6	+ 2.6	67.8	49.3	3.54	—0.79	
Port Arthur, Ont.	29.28	29.96	— 01	52.6	+ 0.4	62.7	42.4	1.98	—1.49	
Winnipeg, Man.	29.13	29.95	+ 02	52.0	— 0.5	63.0	41.1	3.80	+1.80	T.
Minnedosa, Man.	28.15	29.95	+.02	49.8	— 0.7	60.1	39.5	3.02	+1.60	1.5
Qu'Appelle, Assin.	27.68	29.94	+.01	46.5	— 4.6	55.1	38.0	4.17	+3.03	8.5
Medicine Hat, Assin.	27.67	29.95	+.06	49.6	— 5.4	60.5	38.8	2.41	+1.56	4.0
Swift Current, Assin.	27.39	29.97	+.02	46.8	— 6.3	55.4	38.3	3.84	+2.71	5.0
Calgary, Alberta	26.40	29.93	+ 02	45.2	— 4.6	55.8	34.7	2.95	+2.05	2.7
Banff, Alberta	25.84	29.99	+.08	42.9	— 2.9	52.9	32.9	2.05	+0.57	0.8
Edmonton, Alberta	27.66	29.96	+.05	45.1	— 4.2	54.7	35.5	4.32	+2.83	10.8
Prince Albert, Sask.	28.40	29.94	+.02	46.2	— 2.2	55.2	37.2	2.81	+1.73	6.0
Battleford, Sask.	28.25	29.99	+.07	46.6	— 5.2	56.6	36.7	2.73	+1.45	8.2
Kamloops, B. C	28.67	29.93	—.04	57.3	— 0.1	69.0	45.6	1.21	+0.18	
Victoria, B. C	29.88	29.98	—.03	56.1	+ 1.3	62.8	49.3	0.90	—1.37	
Barkerville, N. W. T.	25.64	29.93	.....	44.2	— 2.5	55.3	33.1	3.52	+0.66	6.0
Hamilton, Bermuda	29.86	30.02	—.02	80.6	+ 3.2	86.2	74.9	1.92	—3.56	

TABLE VII.—*Heights of rivers referred to zeros of gages, September, 1901.*

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
St. Paul, Minn.	1,954	14	2.8	2	2.0	22-24	2.4	0.8
Reeds Landing, Minn.	1,884	12	1.4	1,16,17	0.9	24,25	1.2	0.5
La Crosse, Wis.	1,819	12	2.6	13,14	1.9	24,25	2.2	0.7
Prairie du Chien, Wis.	1,759	18	2.2	13-15	1.4	7	1.7	0.8
Dubuque, Iowa	1,699	15	2.6	15-17	1.9	6	2.2	0.7
Leclaire, Iowa	1,609	10	1.4	17-19	1.0	4-11	1.1	0.4
Davenport, Iowa	1,593	15	2.4	16	1.6	6-11	1.9	0.8
Muscatine, Iowa	1,562	16	2.7	17-19	2.0	9,10	2.3	0.7
Galland, Iowa	1,472	8	1.0	19,20	0.6	10-12	0.8	0.4
Keokuk, Iowa	1,463	15	0.9	20	0.2	9-12	0.5	0.7
Hannibal, Mo	1,402	13	1.7	21-25	1.1	10,11,15,16	1.4	0.6
Grafton, Ill	1,306	23	3.3	1	2.6	8-16	2.8	0.7
St. Louis, Mo	1,264	50	5.2	22	2.2	17	3.2	3.0
Chester, Ill.	1,189	36	3.8	23	1.6	17,18	2.4	2.2
New Madrid, Mo	1,003	34	16.6	1	8.1	16,17	11.0	8.5
Memphis, Tenn	843	33	15.0	1	4.3	18	7.3	10.7
Helena, Ark	767	42	22.8	1	8.7	19,20	12 7	14 1
Arkansas City, Ark.	635	42	23.0	1	8-3	22	13.1	14.7
Greenville, Miss	595	42	18.9	1	7.0	22	10.8	11 9
Vicksburg, Miss	474	45	20.4	3	6.4	23,24	11.6	14.0
New Orleans, La	108	16	5.9	4,6	4.3	14,29	5.0	1.6
Missouri River.								
Bismarck, N. Dak.	1,309	14	2.8	14	0.9	9	1.7	1.9
Pierre, S. Dak.	1,114	14	6.3	8	2.8	4,11,15	3.3	3.5
Sioux City, Iowa	784	19	9.1	12	5.5	5-8	6.6	3.6
Omaha, Nebr.	669	18	8.8	14	6.2	7,8,23	6.8	2.6
St. Joseph, Mo*	481	10	4.4	16	1.0	8	2.1	3.4
Kansas City, Mo.	388	21	10.5	16	6.6	10	7.8	3.9
Boonville, Mo	199	20	8.7	19	5.5	12	6.5	3.2
Hermann, Mo.	103	24	6.7	20	3.5	14,15	4.4	3.2
Illinois River.								
Peoria, Ill.	135	14	6.3	15-21	5.9	3-11	6.1	0.4
Youghiogheny River.								
Confluence, Pa.	59	10	2.4	2,6	0.9	28-30	1.5	1.5
West Newton, Pa.	15	23	0.9	19	0.1	10,26-28	0.4	0.8
Allegheny River.								
Warren, Pa.	177	14	3.0	17	0.7	12,15	1.6	2.3
Oil City, Pa.	123	13	4.1	17	1.1	12,13	2.2	3.0
Parker, Pa	73	20	5.0	17	1.2	12,29	2.3	3.8
Monongahela River.								
Weston, W. Va.	161	18	0.6	18	—0.4	28	0.0	1.0
Fairmont, W. Va.	119	25	3.2	18	0.8	10-13,28-30	1.2	2.4
Greensboro, Pa.	81	18	8.6	18	6.3	11,13	6.9	2.3
Lock No. 4, Pa.	40	28	9.9	19	5.8	26	7.8	4.1
Conemaugh River.								
Johnstown, Pa.	64	7	2.8	2	1.5	27,28	2.0	1.3
Red Bank Creek.								
Brookville, Pa	35	8	0.7	17	—0.2	25-30	0.3	0.9
Beaver River.								
Ellwood Junction, Pa.	10	14	4.5	17-19	2.8	26-28	3.4	1.7
Great Kanawha River.								
Charleston, W. Va.	58	30	7.9	19	4.6	10	6.6	3.3
Little Kanawha River.								
Glenville, W. Va.	103	20	3.5	18	—1.2	10	0.8	4.7
New River.								
Hinton, W. Va.	95	14	4.8	1,2	2.2	27,28	3.0	2.6
Cheat River.								
Rowlesburg, W. Va.	36	14	4.0	1,2	0.0	28	1.4	4.0
Ohio River.								
Pittsburg, Pa	966	22	7.0	3,4	3.2	22	5.7	3.8
Davis Island Dam, Pa.	960	25	7.4	19	3.0	12,29,30	4.5	4.4
Wheeling, W. Va.	875	36	9.0	18	3.2	13	5.6	5.8
Parkersburg, W. Va.	785	36	9.0	19	4.3	30	6.2	4.7
Point Pleasant, W. Va.	703	39	10.2	20	3.8	12,30	6 1	6.4
Huntington, W. Va.	660	50	13.5	21	6.3	28	9.3	7.2
Catlettsburg, Ky	651	50	13.3	20	5.0	12,13	8.4	8 3
Portsmouth, Ohio	612	50	13.8	21	6.1	13	9.5	7.7
Cincinnati, Ohio	499	50	14.7	22	7.4	16,17	10.9	7.3
Madison, Ind.	413	46	13.4	22	7.0	17	10 4	6.4
Louisville, Ky.	367	28	7.7	22,23	4.3	17,18	6.2	3.4
Evansville, Ind	184	35	10.6	25	6.3	19	8.4	4.3
Paducah, Ky.	47	40	13.4	1	6.7	14,15	9.7	6.7
Cairo, Ill.	1,073	45	19.1	1	8.8	16	12.7	10.3
Muskingum River.								
Zanesville, Ohio.	70	20	7.8	18	6.5	28	7.0	1.3
Scioto River.								
Columbus, Ohio.	110	17	1.9	1-30	1.9	1-30	1.9	0.0
Miami River.								
Dayton, Ohio.	77	18	0.8	2,3	0.4	6,7,25-28	0.6	0.4
Wabash River.								
Mount Carmel, Ill.	50	15	1.2	2	0.4	27-30	0.8	0.8
Licking River.								
Falmouth, Ky.	30	25	4.0	21	1.0	27-30	1.9	3.0
Kentucky River.								
Frankfort, Ky	65	31	14.2	20	5.2	30	7.5	9.0
Clinch River.								
Speers Ferry, Va	156	20	5.5	1	0.0	12,13,30	0.7	5.5
Clinton, Tenn.	52	25	12.5	3	3.9	12,30	6.0	8.6
Tennessee River.								
Knoxville, Tenn.	635	29	8.4	2	1.9	28,29	3.7	6.5
Kingston, Tenn	556	25	7.4	3	2.5	30	4.0	4.9
Chattanooga, Tenn.	452	33	10.3	4	4.3	30	6.9	6.0
Bridgeport, Ala.	402	24	7.8	1,19	2.6	29,30	4.9	5.2
Florence, Ala.	255	16	8.0	20	3.2	14	5.5	4.8
Riverton, Ala	225	25	11.2	19	3.8	13,14,28	7.1	7.4
Johnsonville, Tenn.	93	24	13.8	1	5.0	30	8.7	8.8

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Cumberland River.	*Miles.*	*Feet*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Burnside, Ky.	516	50	29.5	18	2.4	12,29,30	5.6	27.1
Carthage, Tenn.	305	40	21.8	20	2.0	13,14	6.2	19.8
Nashville, Tenn	189	40	23.7	21	3.2	14	8.7	20.5
Clarksville, Tenn.	126	42	24.0	23	5.2	14	11.2	18.8
Arkansas River.								
Wichita, Kans.	832	10	1.7	26	0.6	6-8	1.1	1.1
Webbers Falls, Ind. T.	465	23	2 7	21	1.5	1-3,5-20	1.6	1.2
Fort Smith, Ark.	403	22	2.5	18	0.5	30	1.3	2.0
Dardanelle, Ark.	256	21	1.5	21,25	0.2	6-8,11-14	0.7	1.3
Little Rock, Ark.	176	23	2.6	23	1.3	16	1.9	1.3
White River.								
Newport, Ark.	150	26	0.0	1-6,18,19	—0.2	11-13,20-30	—0.1	0.2
Yazoo River.								
Yazoo City, Miss.	80	25	9.1	1	1.0	13	5.9	8.1
Red River.								
Arthur City, Tex.	638	37	6.4	18	3.6	10-12	4.6	2.8
Fulton, Ark.	515	28	10.0	17	3.7	12,13	5.7	6.3
Shreveport, La	327	29	4.6	21	0.8	16	2.2	3.8
Alexandria, La	118	33	1.8	15,26	—0.7	13,14	0.4	2.5
Ouachita River.								
Camden, Ark	304	39	13.7	18	3.0	1-9	5.3	10.7
Monroe, La	122	40	7.8	20-22	0.4	12-14	2.7	7.4
Atchafalaya River.								
Melville, La.	100	31	17.1	6,7	9.9	23,25	13.0	7.2
Susquehanna River.								
Wilkesbarre, Pa.	183	14	3.1	3	—1.2	10-18	—0.1	4.3
Harrisburg, Pa.	69	17	5.2	4	1.7	29,30	2.8	3.5
W. Br. of Susquehanna.								
Williamsport, Pa.	39	20	6.8	3	1.2	28	2.7	5.6
Juniata River.								
Huntingdon, Pa.	90	24	5.7	1	3.0	23-30	3.7	2.7
Potomac River.								
Harpers Ferry, W. Va.	172	16	8.0	2	—3.0	24-29	—0.8	11.0
James River.								
Lynchburg, Va	260	18	2.7	3	0.6	7	1.3	2.1
Richmond, Va.	111	12	3.4	30	—0.5	28	0.8	3.9
Roanoke River.								
Weldon, N. C.	129	40	18.3	20	9.0	17	10.7	9.3
Cape Fear River.								
Fayetteville, N. C.	112	38	43.6	20	4.0	16	12.3	39.6
Edisto River.								
Edisto, S. C.	75	6	5.7	24-27	3.0	16	4.5	2.7
Pedee River.								
Cheraw, S. C.	149	27	30.3	19	3.5	16	9.2	26.8
Black River.								
Kingstree, S. C	60	12	10.6	27,28	3.0	17	6.3	7.6
Lynch Creek.								
Effingham, S. C.	35	12	14.5	25	3.7	17,18	7.9	10.8
Santee River.								
St. Stephens, S. C.	50	12	12 5	27	7.9	21,22	10.1	4.6
Congaree River.								
Columbia, S. C.	37	15	19.9	19	2.0	28,29	5.5	17.9
Wateree River.								
Camden, S. C.	45	24	28.4	19	6.2	16	12.3	22.2
Waccamaw River.								
Conway, S. C.	40	7	5.7	1	3.3	19	4.5	2.4
Savannah River.								
Calhoun Falls, S. C.	347	15	17.2	18	2.9	14-16	4.4	14.3
Augusta, Ga.	208	32	31.6	19	9.0	16,17	13.0	22.6
Broad River.								
Carlton, Ga.	30	11	14.8	18	2.7	10,11,14-16	3.8	12.1
Flint River.								
Albany, Ga	80	20	25.2	22	6.1	30	11.7	19.1
Chattahoochee River.								
Westpoint, Ga	239	20	12.7	19	3.1	11,12	4.5	9.6
Ocmulgee River.								
Macon, Ga.	125	18	18.5	18	2.3	13	5.0	16.2
Oconee River.								
Dublin, Ga.	79	30	19.4	22	0.6	15	6.8	18.8
Coosa River.								
Rome, Ga	271	30	11.2	18	1.8	13	3.7	9.4
Gadsden, Ala	144	18	10.5	20	1.9	15,16	3.9	8.6
Alabama River.								
Montgomery, Ala.	265	35	12.0	1	2.0	12,13,27,28	5.1	10.0
Selma, Ala.	212	35	17.0	1	3.2	13	6.9	13.8
Tombigbee River.								
Columbus, Miss.	303	33	3.5	20	—2.5	11,12	—0.9	6.0
Demopolis, Ala.	155	35	11.7	21	—0.1	13	4.3	11.8
Black Warrior River.								
Tuscaloosa, Ala	129	43	16.0	19	1.3	13	5.0	14.7
Brazos River.								
Kopperl, Tex.	369	21	3.5	13	—0.2	24-26,29,30	0.2	3.7
Waco, Tex	301	22	3.9	15	0.8	9-12	1.6	3.1
Booth, Tex.	76	39	3.0	22,23	0.0	4,13-19	0.8	3.0
Red River of the North.								
Moorhead, Minn.	418	.....	7.7	1-5,27-31	7.5	24,25	7.6	0.2
Columbia River.								
Umatilla, Oreg	270	25	7.0	1	3.2	30	5.2	3.8
The Dalles, Oreg	166	40	9.8	1	4.2	30	7.1	5.6
Willamette River.								
Albany, Oreg	119	20	2.6	28	0.8	1-9	1.2	1.8
Portland, Oreg	12	15	5.0	2,3	2.2	20	3.6	2.8
Sacramento River.								
Red Bluff, Cal.	265	23	0.4	25	—0.4	14-18	—0.2	0.8
Sacramento, Cal.	64	29	8.5	27,28	7.2	21,22	7.6	1.3

*Twenty-six days only.

XXIX–98.

Chart I. Tracks of Centers of High Areas. September, 1901.

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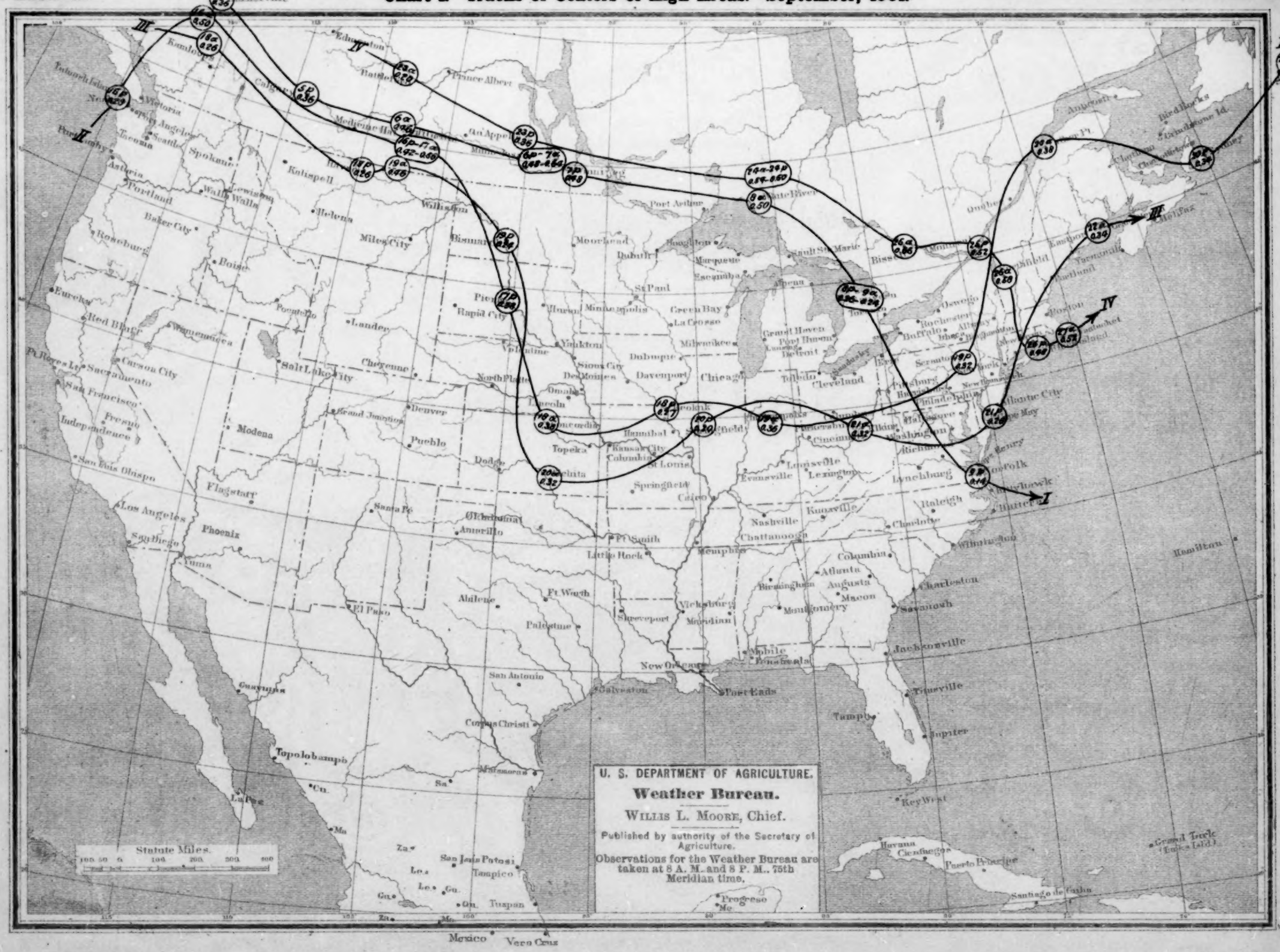

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Chart II. Tracks of Centers of Low Areas. September, 1901.

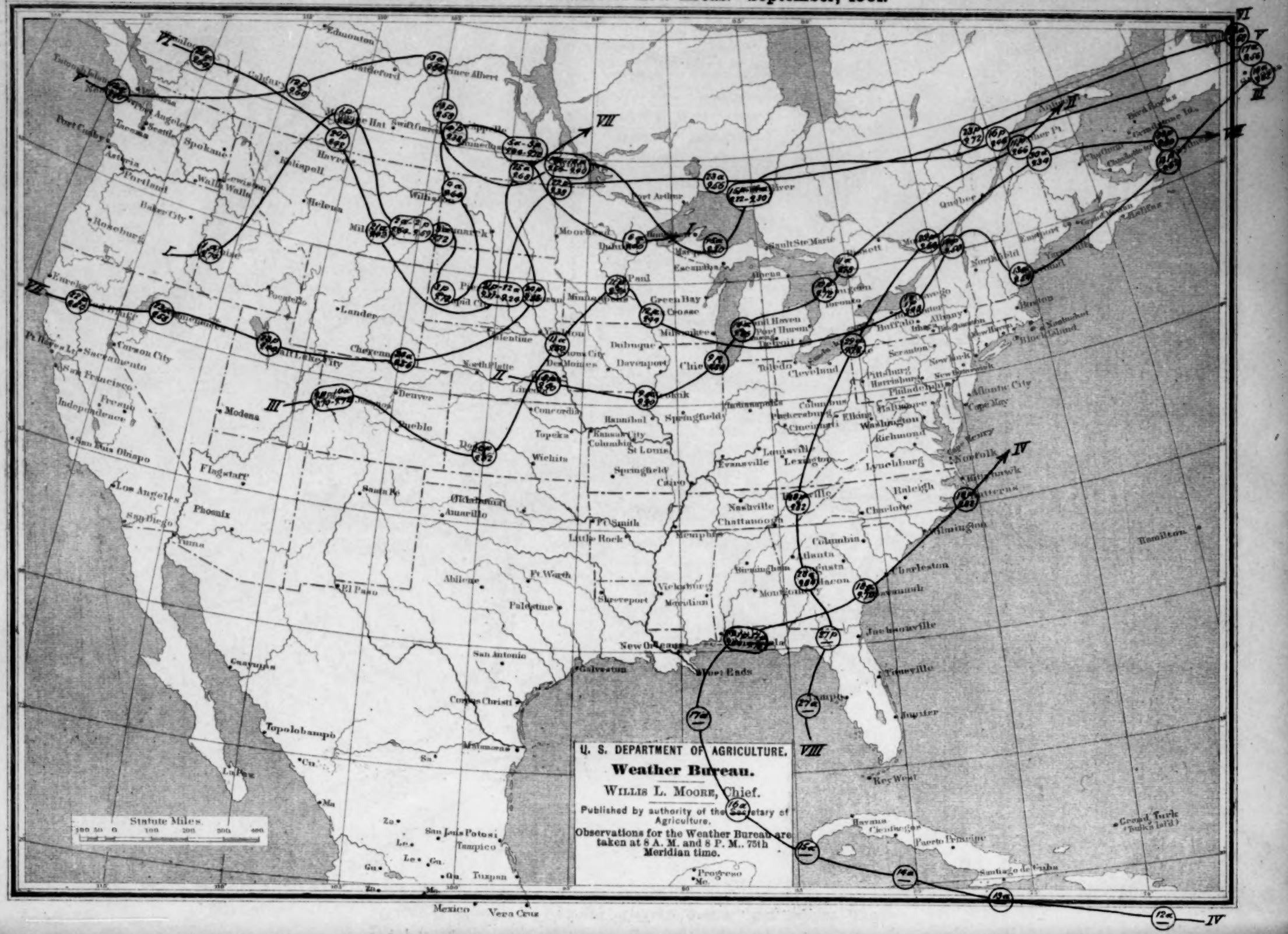

Chart III. Total Precipitation. September, 1901.

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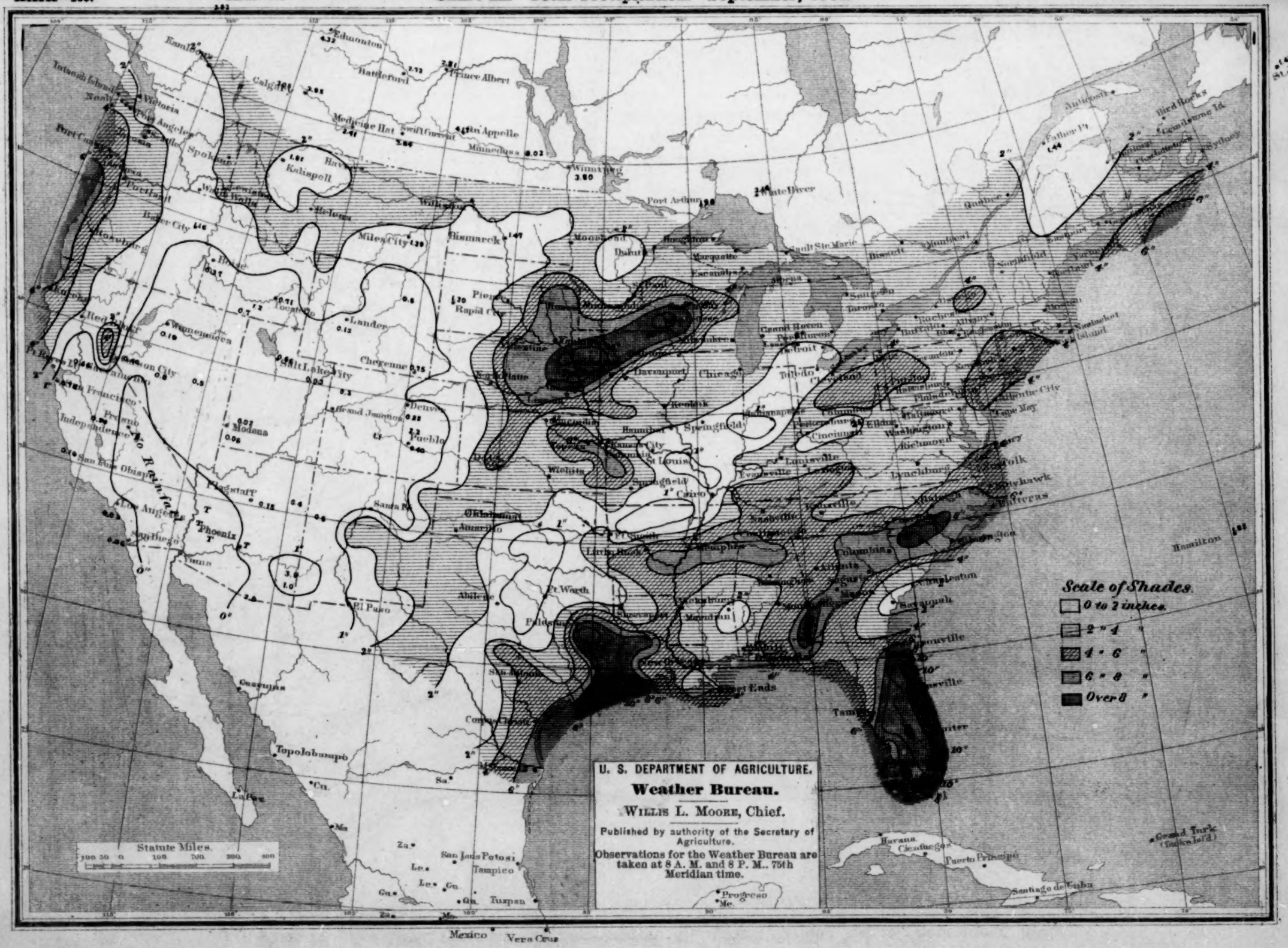
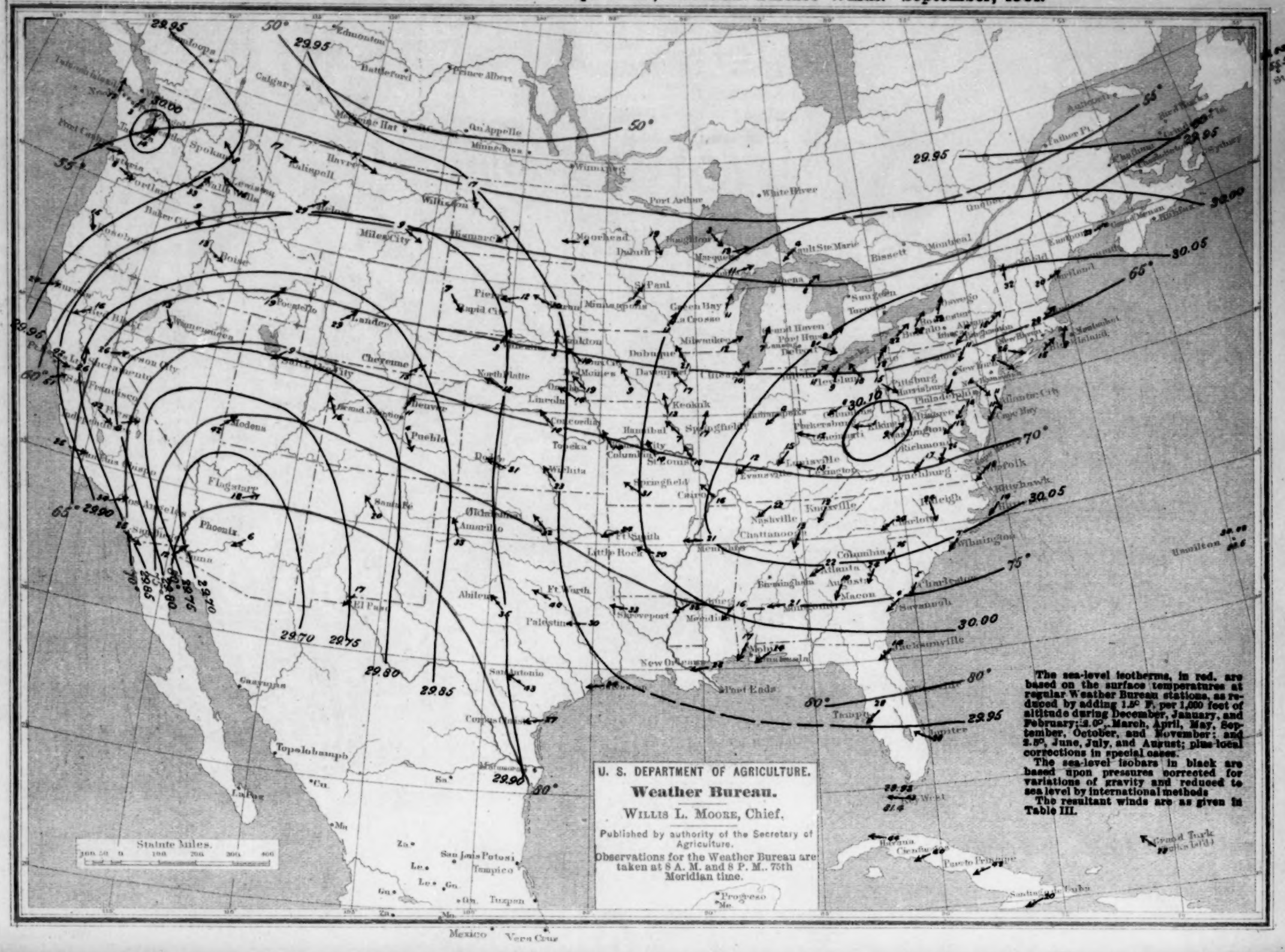


Chart IV. Sea-Level Pressure and Temperature; Resultant Surface Winds. September, 1901.



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The sea-level isotherms, in red, are based on the surface temperatures at regular Weather Bureau stations, as reduced by adding 1.5° F. per 1,000 feet of altitude during December, January, and February; 2.0°, March, April, May, September, October, and November; and 2.5°, June, July, and August; plus local corrections in special cases.

The sea-level isobars in black are based upon pressures corrected for variations of gravity and reduced to sea level by international methods.

The resultant winds are as given in Table III.

Chart V. Hydrographs for Seven Principal Rivers of the United States. · September, 1901.

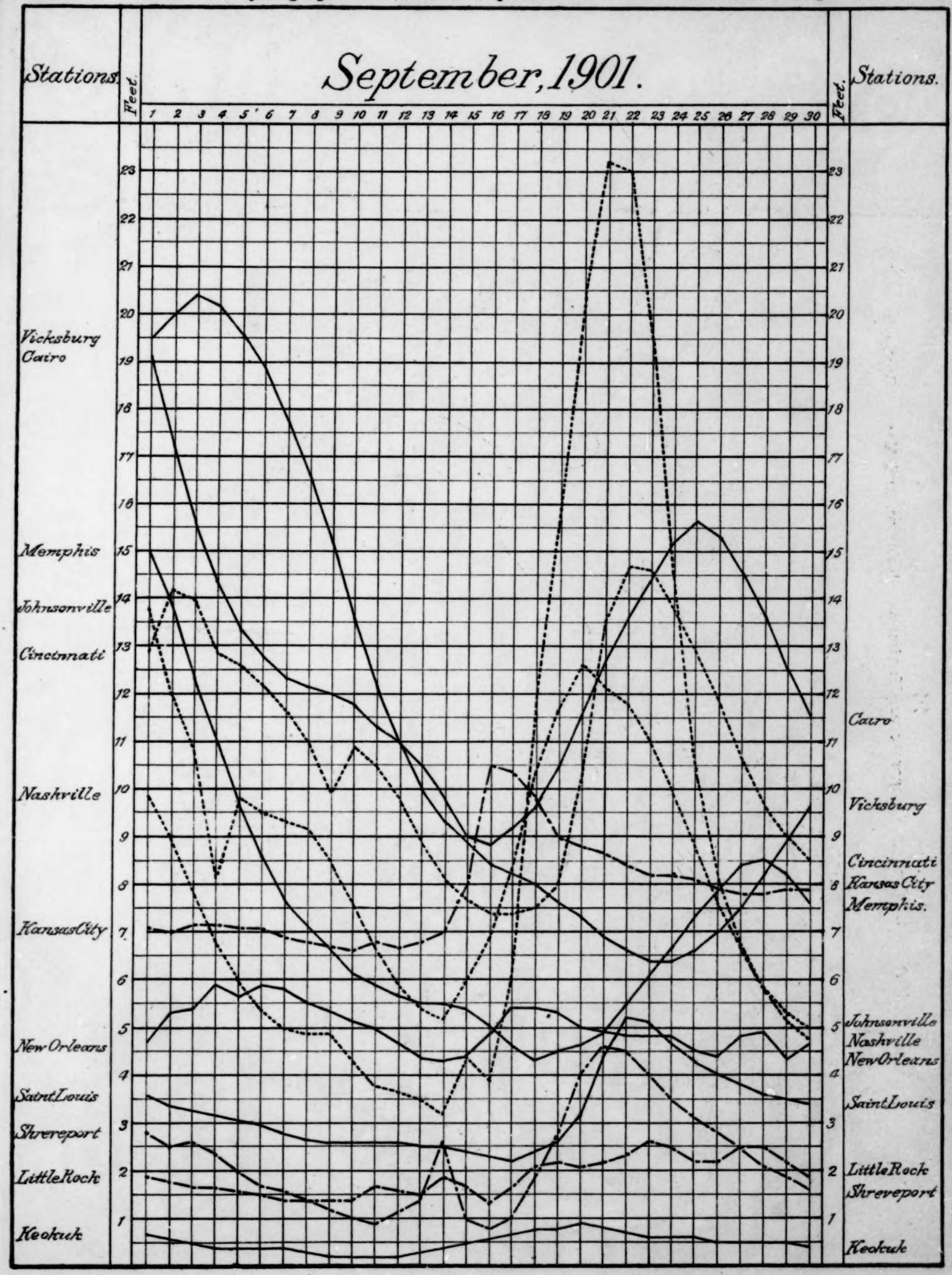
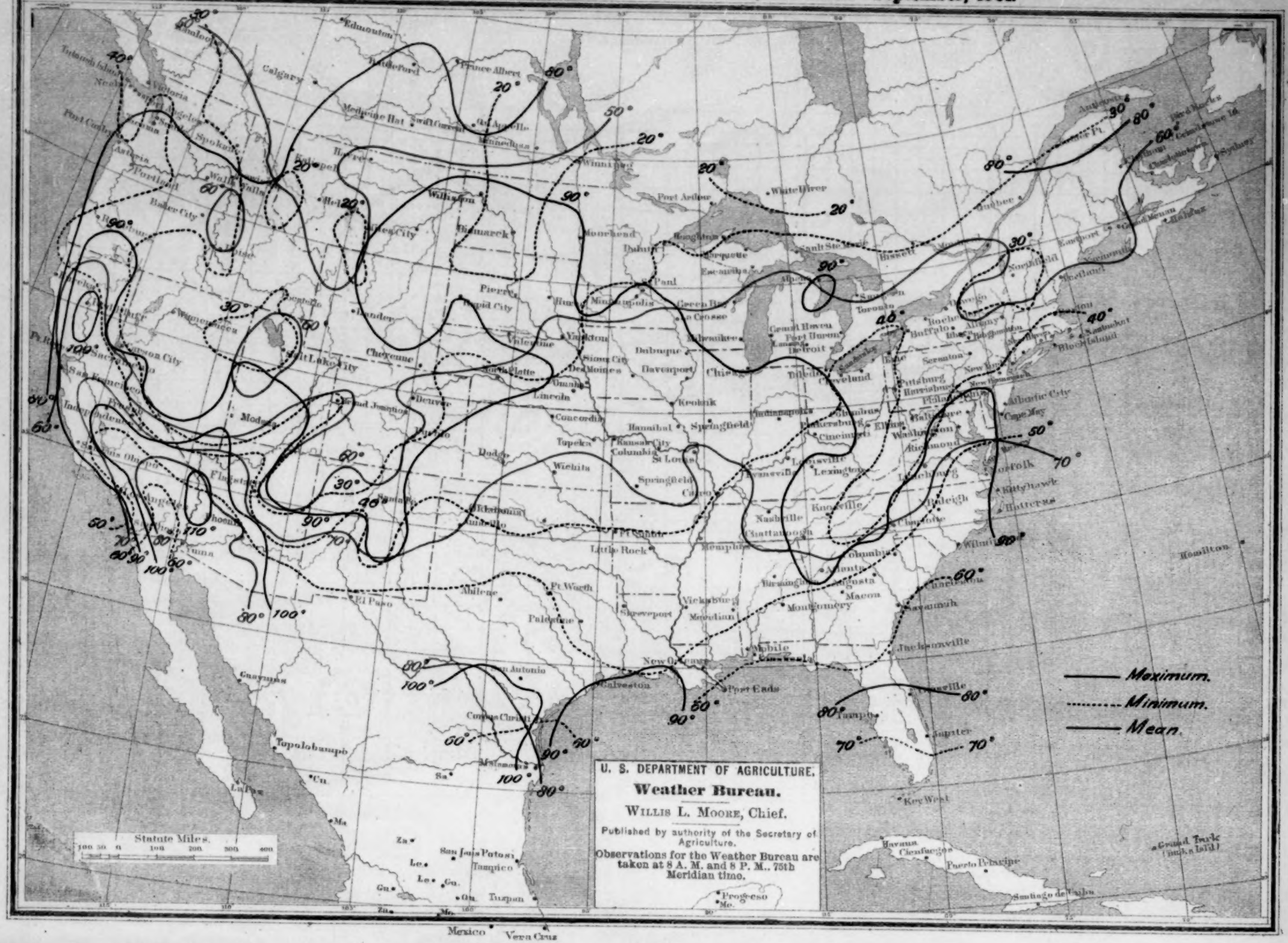


Chart VI. Surface Temperatures; Maximum, Minimum, and Mean. September, 1901.


Statute Miles.
100 50 0 100 200 300 400
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Maximum.
Minimum.
Mean.

Chart VII. Percentage of Sunshine. September, 1901.

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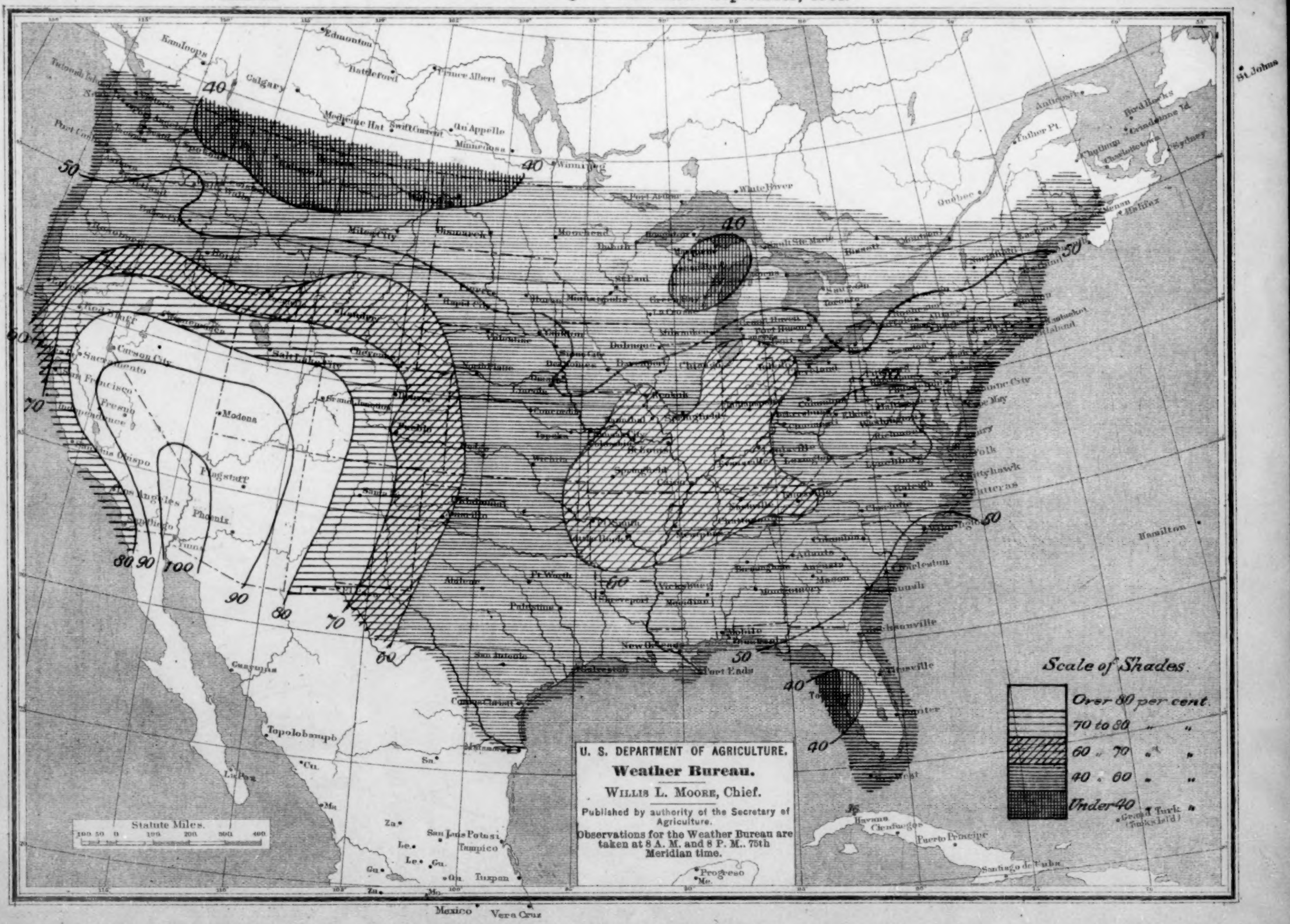

Chart VIII. West Indian Monthly Isobars, Isotherms, and Resultant Winds. September, 1901.

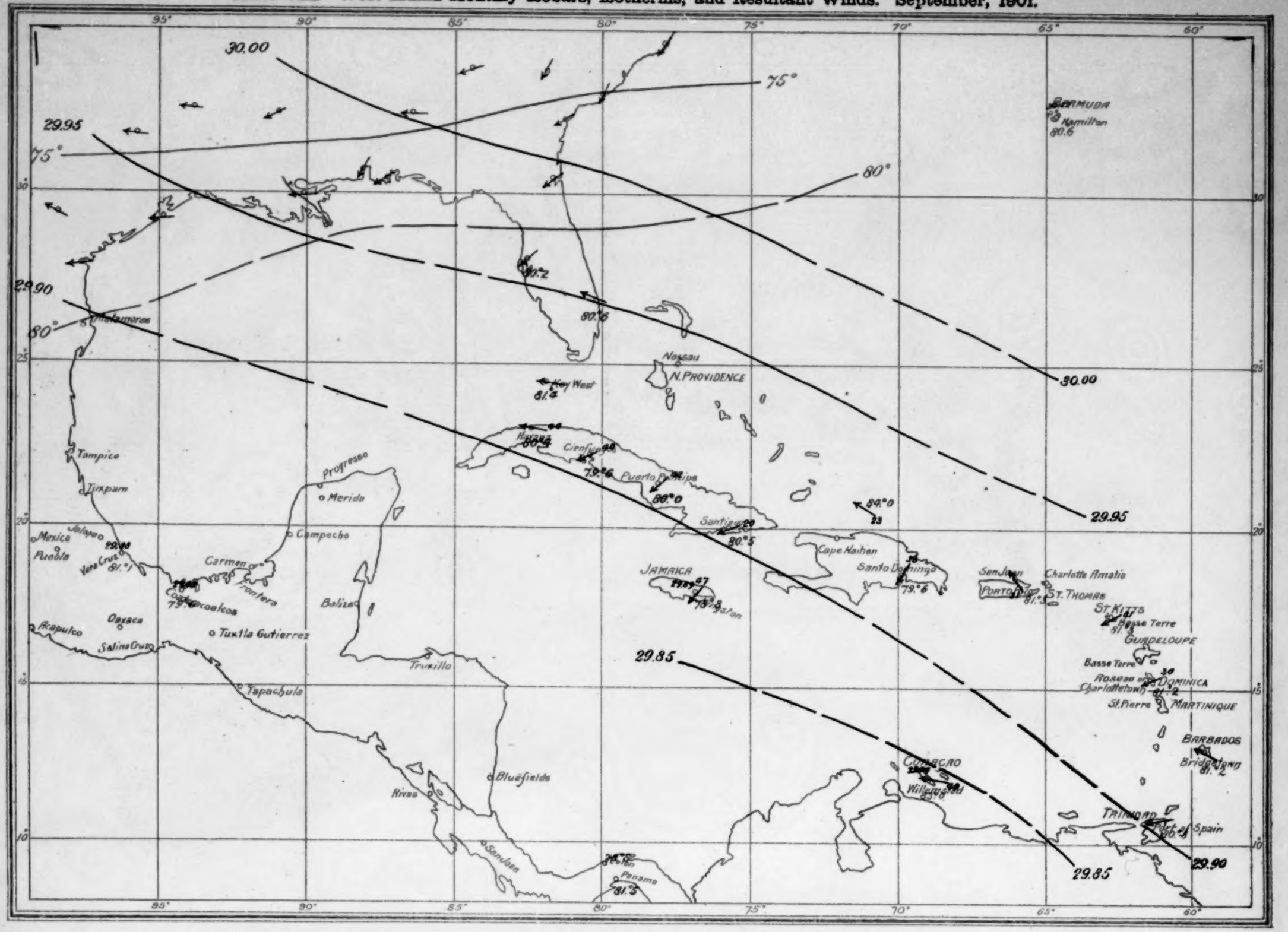

Chart IX. Total Snowfall for September, 1901.

• Barkerville

• Barkerville

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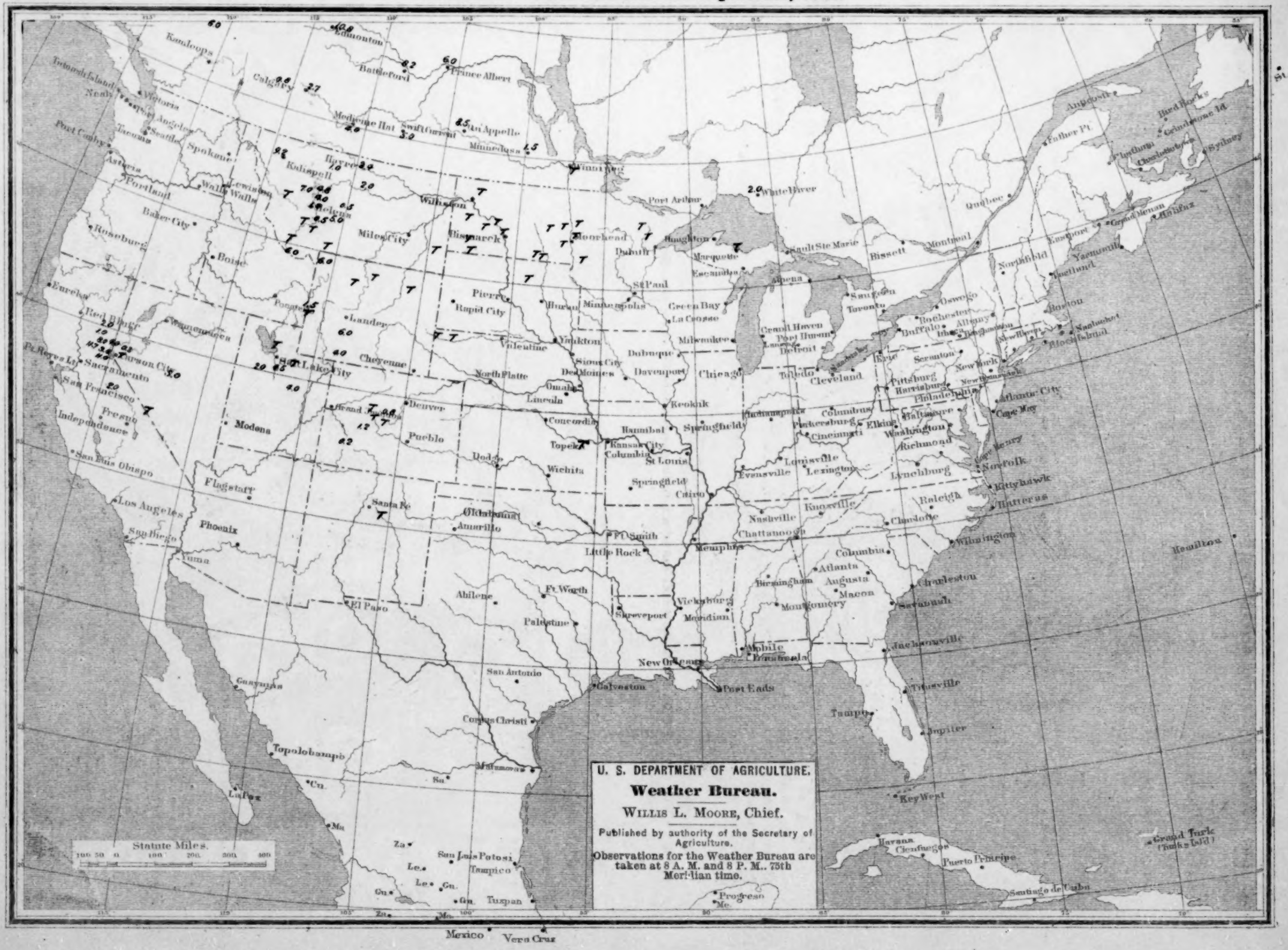
Statute Miles.
100 50 0 100 200 300 400
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St Johns
Mexico
Vera Cruz

XXIX—107. **Chart X. Annual Normal Surface Isobars and Wind and Cloud Directions in Arctic Regions.**

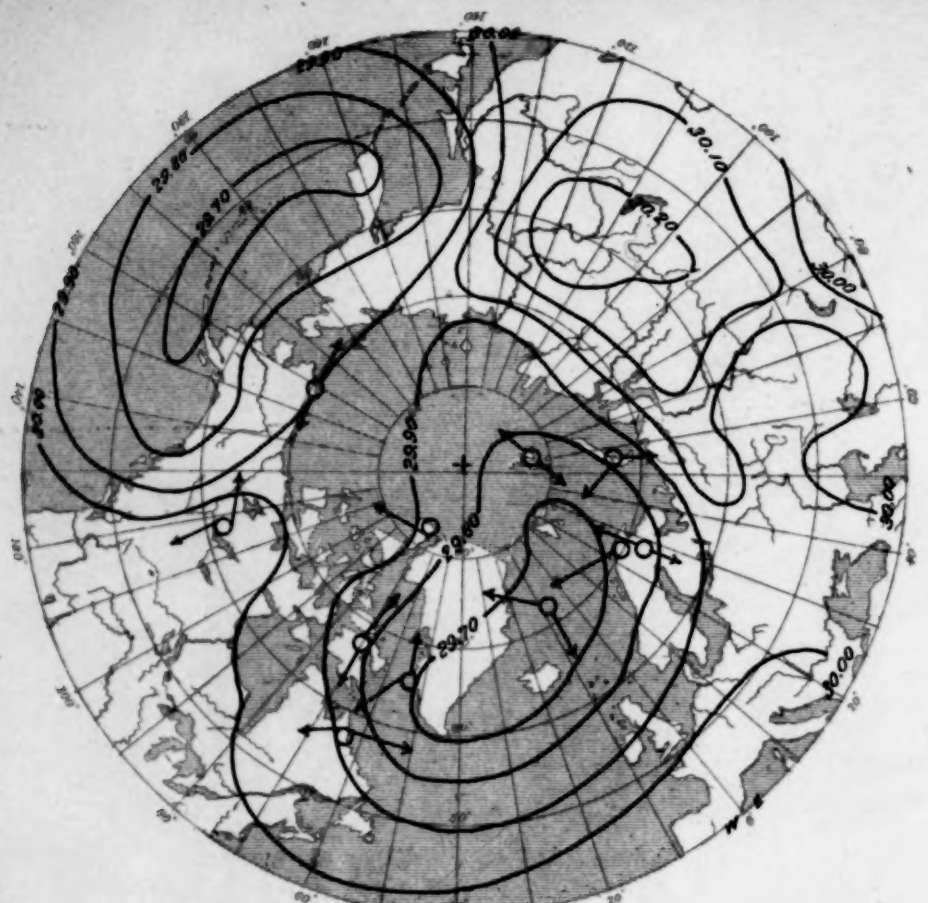

FIG. 1.—Annual normal sea level isobars and prevailing directions of surface winds.

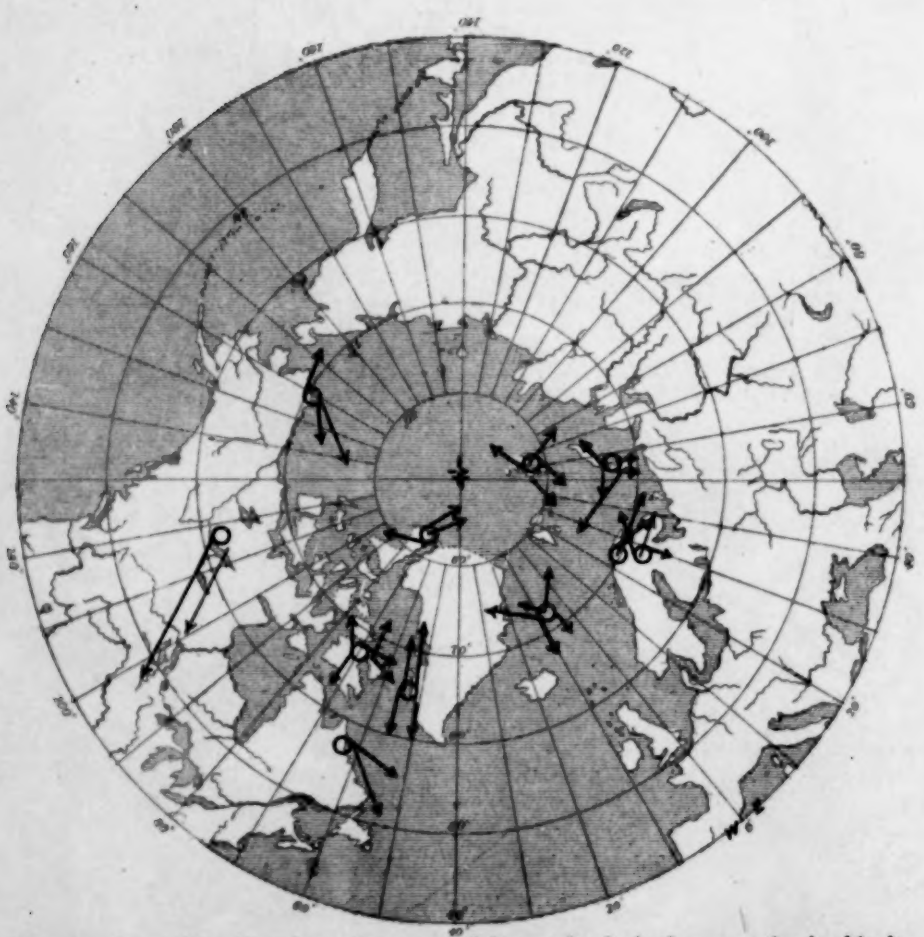

FIG. 2.—Prevailing directions of upper and lower clouds (red, upper clouds; black, lower clouds).